APPENDIX E

SOIL BORING LOGS AND MONITORING WELL CONSTRUCTION DIAGRAMS

MUNDELL & ASSOCIATES, INC.
BORING LOG

BORING NO: GP-02 MMW-P-02

CLIENT: AIMCO	**DATE BEGAN:** 08/18/04 — PAGE 1 OF 1
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED:** 08/18/04
PROJECT NAME: Michigan Meadows	**DRILLING METHOD:** Direct Push
PROJECT NO: M01046	**DRILL EQUIP:** Geoprobe 5400
DRILLING CONTRACTOR: American Drilling Services	**GW DEPTH (OBSERVED):** 9.0'
DRILLER: Rick Davis	**DEPTH OF BORING:** 12'
BORING LOCATION: SW Corner of the Plaza	**TOP OF CASING ELEVATION:** N/A
FIELD GEOLOGIST: Leena Lothe & Jason Armour	**SURFACE ELEVATION:** N/A
NOTES: SL sample:GP-02-7'; 1 GW sample: GP-02-12'	**COMMENTS:**

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Well Completion Diagram
ASPHALT: About 3 inches of ASPHALT		0.2	4.2	85%			0.0	
GRAVEL: about 6 inches of GRAVEL, GRAVEL BASE COURSE		0.75						
FILL: Fine to medium fill SAND, dark yellowish brown (10 YR 4/4), dry, no odor			5.8					
			5.7					
CL: SILTY CLAY with trace sand and gravel, trace root fragments, very dark gray (10 YR 3/1), slight moist, slightly organic odor	CL	3.0	5.4					
			NA	50%				
			NA				5.0	
- orange coloration observed - maybe Iron, dark brown (10 YR 3/3) with occasional orange-red (2.5 YR 5/8) from about 7.0' to 8.0'			7.5		✱			
			5.1					
SW: FINE TO COARSE SAND with trace to some fine to medium gravel, light yellowish brown (2.5 Y 6/4), wet, no odor	SW	8.0	NA	75%				▼
			5.3					
- black staining (10 YR 2/1) with possible septic odor observed at about 9.8' - 10.4' , fragments of clay tile at 10.4'			5.2				10.0	
SP: FINE TO MEDIUM SAND with trace coarse sand and fine gravel, light yellowish brown (2.5 Y 6/4), wet, no odor	SP	11.0	6.8		✱			
- End of the Boring at 12'		12.0					15.0	

SOIL BORING NO: GP-01

BORING LOG

MW NO:

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Rick Davis
BORING LOCATION: Center of Michigan Plaza
FIELD GEOLOGIST: Leena Lothe & Jason Armour
NOTES: SL sample:GP-01-15.5'; 2 GW samples: GP-01-21' & GP-01-30'

DATE BEGAN: 08/18/04
DATE FINISHED: 08/18/04
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 19.0'
DEPTH OF BORING: 30.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)
ASPHALT: About 3 inches of ASPHALT		
CRUSHED LIMESTONE: CRUSHED LIMESTONE, light olive brown (2.5 Y 5/6), dry, no odor		0.2
SAND: Fine to medium SAND with trace to some gravel - potential fill, light olive brown (2.5 Y 5/6), dry, no odor	SW	2.6
CL: SILTY CLAY with trace to some sand, dark olive brown (2.5 Y 3/3), dry, slightly organic odor - slightly organic odor observed from about 4.5' to 5.0'	CL	3.5
SW: MEDIUM TO COARSE SAND with trace to some fine to medium gravel, light yellowish brown (2.5 Y 6/4), dry, no odor	SW	6.0
SP: FINE TO MEDIUM SAND with trace coarse sand and fine gravel, light yellowish brown (2.5 Y 6/4), dry, no odor	SP	10.0
SW: MEDIUM TO COARSE SAND with trace to some fine to medium gravel, color changes back to light yellowish brown (2.5 Y 6/4), dry, no odor - color change to dark yellowish brown (10 YR 4/6) beyond 11' - color changes back to yellowish brown (2.5 Y 6/4) beyond 14.5'	SW	11.0
SP: FINE TO MEDIUM SAND with trace silt and fine gravel, light yellowish brown (2.5 Y 6/4), dry - wet, no odor	SP	18.5
ML: SILT with trace sand and trace fine gravel, dark gray (2.5 Y 4/1), wet, no odor	ML	19.75
SW: MEDIUM TO COARSE SAND with trace to some fine to medium gravel, gray (2.5 Y 5/1), dry - wet, no odor		20.0

PID Headspace (ppm)	Rec. %	Depth (feet)
5.1		0.0
5.3		
7.8	70%	
7.9		
NA		
6.6		5.0
7.0	75%	
7.8		
NA		
8.1		
7.8	60%	10.0
8.5		
NA		
7.1		
8.5	75%	
7.3		15.0
NA		
NA		
8.3	50%	
9.5		
NA		20.0
NA		
11.5		
17.5	60%	

Sample Location | Sample ID | Well Construction Diagram

	SW		30.0					
			NA				25.0	
			NA					
			17.5					
			21.9	55%				
- End of the Boring at 30'			31.1				30.0	

MMW-P-03D

MUNDELL & ASSOCIATES, INC.
BORING LOG

BORING NO: GP-03

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Rick Davis
BORING LOCATION: South of the Plaza (center one)
FIELD GEOLOGIST: Leena Lothe & Jason Armour
NOTES: SS:GP-03-16'; 3 GW samples:GP-03-20', GP-03-30' & GP-03-40'

DATE BEGAN: 08/18/04
DATE FINISHED: 08/18/04
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 18.0'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Well Completion Diagram
							0.0	
ASPHALT: About 3 inches of ASPHALT		0.2	2.2	98%				
GRAVEL: about 6 inches of BASE COURSE		0.75						
CL: SILTY CLAY with trace to some medium to coarse and trace to medium gravel, very dark gray (10 YR 3/1), slightly moist, organic odor - color change to dark yellowish brown (10 YR 3/6) at 2'	CL		1.9 2.0 1.9					
SW: MEDIUM TO COARSE SAND with trace to some fine to medium gravel, dark brown (7.5 YR 4/3), dry, no odor	SW	4.0	NA 6.6 6.5 6.2	55%			5.0	
- color change to light yellowish brown (2.5 Y 6/4) at 6.5' with some gravel observed.			NA 8.1 8.4 9.5	55%			10.0	
SP: FINE TO MEDIUM SAND with trace coarse sand and fine gravel, trace silt, light yellowish brown (2.5 Y 6/4), dry, no odor	SP	11.5	NA 8.1 8.8 12.9	60%			15.0	
			NA 8.2 8.1 11.3	60%	✱ (16')			▼ (18.0')
CL: SILTY CLAY with some medium to coarse sand, light olive brown (2.5 Y 5/6), dry, no odor	CL	19.5						
SW: MEDIUM TO COARSE SAND with trace to some fine to medium gravel, dark brown (7.5 YR 4/3), dry, no odor		20.0	NA 6.6 7.4		✱ (20')		20.0	

MMW-P-03D

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-03

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Rick Davis
BORING LOCATION: South of the Plaza (center one)
FIELD GEOLOGIST: Leena Lothe & Jason Armour
NOTES: SS:GP-03-16'; 3 GW samples:GP-03-20', GP-03-30' & GP-03-40'

DATE BEGAN: 08/18/04
DATE FINISHED: 08/18/04
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 18.0'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Well Completion Diagram
	SW		12.6	60%				
			11.8					
			NA				25.0	
			NA					
			NA					
			11.6	40%				
			8.3					
BL. DRILLED FROM 30' to 40'		-30.0					30.0	
							35.0	
- End of the Boring at 40'							40.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

SOIL BORING NO: GP-04

MW NO:

PAGE 1 OF 1

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Rick Davis
BORING LOCATION: SE Corner of the Plaza
FIELD GEOLOGIST: Leena Lothe & Jason Armour
NOTES: SS:GP-04 (16'); 1 GW sample:GP-04-22'

DATE BEGAN: 08/18/04
DATE FINISHED: 08/18/04
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 18.5'
DEPTH OF BORING: 20.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Well Construction Diagram
ASPHALT: About 3 inches of ASPHALT		0.25	4.5				0.0	
GRAVEL: about 6 inches of BASE COURSE		0.75						
CL: SILTY CLAY with trace medium to coarse sand, dark yellowish brown (10 YR 3/4), slightly moist, no odor	CL		4.8, 5.8, 5.5	80%				
SW: FINE TO COARSE SAND with trace to some fine gravel, dark brown (10 YR 4/3), dry, no odor	SW	3.5	6.5, 6.5, 8.0, 7.2, 6.2	85%			5.0	
SP: FINE TO MEDIUM SAND with trace silt, dark yellowish brown (10 YR 4/4), dry, no odor	SP	9.5	10.2, 8.8	80%			10.0	
SW: FINE TO COARSE SAND with trace to some fine gravel, dark yellowish brown (10 YR 4/3) with intermittent orange-red orange coloration observed - maybe Iron, dark brown (10 YR 3/3) with occasional orange-red (2.5 YR 5/8) coloration, dry, no odor - color change to brownish yellow (10 YR 6/8) at 15'	SW	11.5	7.2, NA, 11.3, 15.1, 13.0, 5.2, 4.8	75%			15.0	
SP: FINE TO COARSE SAND, dark yellowish brown (10 YR 3/4), slightly wet, no odor	SP	18.5	6.9, 7.1	50%			20.0	
- End of the Boring at 22'		20.0						

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-05 MMW-P-05

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CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Rick Davis
BORING LOCATION: East side of plaza parking lot
FIELD GEOLOGIST: Leena Lothe & Jason Armour
NOTES: SS:GP-05 (17'); 1 GW sample:GP-05-22'

DATE BEGAN: 08/18/04
DATE FINISHED: 08/18/04
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 19'
DEPTH OF BORING: 22.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Well Completion Diagram
ASPHALT: About 3 inches of ASPHALT							0.0	
FILL: FILL medium sand with some clay, first four inches BASE COURSE followed by yellowish brown (10 YR 4/4) fill material, slight moist, no odor		0.25	5.4					
			4.5					
CL: SILTY CLAY with trace to some sand, trace fine gravel and coarse sand, very dark gray (10 YR 3/1), trace roots and natural wood fragments, slightly moist, slight organic odor	CL	2.0	3.4	90%				
			3.8					
			3.3					
- color change to dark yellowish brown (10 YR 3/4) at 3' with some sand, no odor			3.9				5.0	
- grading to some coarse and medium sand with trace to some fine to medium gravel beyond 4'			3.9	80%				
SW: MEDIUM TO COARSE SAND with trace to some fine to medium gravel, dark yellowish brown (10 YR 4/4), dry, no odor	SW	7.0	3.8					
			3.9					
			4.0					
			5.0	90%			10.0	
			3.6					
			6.7					
- color change to yellowish brown (10 YR 5/8) at 10-11'			5.6					
			6.0	90%				
SP: FINE SAND with trace coarse sand, trace to some fine gravel, light olive brown (2.5 Y 5/4), dry, no odor	SP	15.0	5.2				15.0	
			6.8					
			9.9					
- soil becomes slightly moist at 18'			4.7	50%				
			4.8					
ML: SILT with trace fine sand, gray (2.5 Y 5/1), no odor	ML	19.5						
		20.0					20.0	
- blind drilled								
- End of the Boring at 22'								

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-07

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows (Plaza)
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: just SW of the bus shelter
FIELD GEOLOGIST: Leena Lothe/Chris Jaros/Megan Hill
NOTES:

DATE BEGAN: 09/30/05
PAGE 1 OF 1
DATE FINISHED: 09/30/05
DRILLING METHOD: HSA with 4' Geoprobe Sampler
DRILL EQUIP: Geoprobe 5410
GW DEPTH (OBSERVED): 16-20'
DEPTH OF BORING: 20'
TOP OF CASING ELEVATION:
SURFACE ELEVATION: N/A
COMMENTS: Shallow GW samples, no soil screening

Lithologic Description	USCS Symbol	Stratum Depth(feet)	Blow Counts	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Well Completion Diagram
Blind Drilled upto 20'								0.0	
								5.0	
								10.0	
								15.0	
End of Boring at 20'							GP-A-03 (20')	20.0	

MUNDELL & ASSOCIATES, INC.
BORING LOG

BORING NO: GP-08

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows (Plaza)
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: approx. 100' E (grass) of the plaza parking lot
FIELD GEOLOGIST: Leena Lothe/Chris Jaros/Megan Hill
NOTES:

DATE BEGAN: 09/30/05
DATE FINISHED: 09/30/05
DRILLING METHOD: HSA with 4' Geoprobe Sampler
DRILL EQUIP: Geoprobe 5410
GW DEPTH (OBSERVED): 16-20'
DEPTH OF BORING: 20'
TOP OF CASING ELEVATION:
SURFACE ELEVATION: N/A
COMMENTS: Shallow GW samples, no soil screening

Lithologic Description	USCS Symbol	Stratum Depth(feet)	Blow Counts	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Well Completion Diagram
Blind Drilled upto 20'								0.0	
								5.0	
								10.0	
								15.0	▼
End of Boring at 20'						✱	GP-A-03 (20')	20.0	

Boring/Well ID: GP-20

Mundell Consulting Professionals — for the Earth and the Environment

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/7/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/7/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 18.5 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0 – 0.5		Grass/Topsoil	.50				
0.5 – 2	CL	SILTY CLAY with trace sand, brown (10YR 5/3), loose, moist		0.2	50		
2 – 4	CL	No Recovery 2.0 - 4.0 ft	4.0	-			
4 – 6	SW-GW	SAND and GRAVEL, well graded, brown (10YR 5/3), loose, moist		0.3	50		
6 – 8	SW-GW	No Recovery 6.0 - 8.0 ft		-			
8 – 8.5	SW-GW		8.5	0.3	75		
8.5 – 9	SP	Fine grained SAND with trace gravel, poorly graded, brown (10YR 5/3), loose, moist	9.0				
9 – 10	SW	Fine to coarse grained SAND with trace gravel, well graded, brown (10YR 5/3), loose, moist					
10 – 11	SW			0.3			
11 – 12	SW	No Recovery 11.0 - 12.0 ft	12.0	-			
12 – 14	SW-GW	SAND and GRAVEL, well graded, brown (10YR 5/3) dense, moist		0.3	75		
14 – 15	SW-GW			0.3			
15 – 16	SW-GW	No Recovery 15.0 - 16.0 ft		-			
16 – 17	SW-GW		17.0	0.3	75	*	Soil Sample: GP-20 16-18'
17 – 18.5	SW	Fine to medium grained SAND with trace gravel, well graded, brown (10YR 5/3) dense, moist; silty clay seam, yellowish red (5YR 5/8), at 17.0 ft	18.5				
18 – 19				0.3			
18.5 – 20	SW-GW	SAND and GRAVEL, well graded, brown (10YR 5/3), moist, dense; Wet at 18.5 ft; No recovery 19.0 -20.0 ft		-			
20 – 22	SW-GW			0.3	75		
22 – 23	SW-GW			0.3			
23 – 24	SW-GW	No Recovery 23.0 - 24.0 ft		-			

GP-20

2" Dia. Borehole

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: GP-20

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/7/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/7/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 18.5 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
24	SP-GP	Coarse grained SAND and GRAVEL, poorly graded, brownish gray (10YR 6/2), dense, wet					
25	SW	Medium to fine grained SAND, well graded, brownish gray (10YR 6/2), dense, wet		0.2			
26				0.2	75		
27		coarse sand and gravel seam at 27.0 ft		-			
28		No Recovery 27.0 - 28.0 ft	28.0				
29	SW-GW	SAND and GRAVEL, well graded, brownish gray (10YR 6/2), dense		0.3			
30					88	*	Water Sample: GP-20 30'
31				0.3			
31.5		No Recovery 31.5 - 32.0 ft		-			
32	SW	Fine to coarse grained SAND with trace gravel, well graded, brownish gray (10YR 6/2), dense, wet	32.0				
33				0.2			
33.5	SW-GW	SAND and GRAVEL, well graded, brownish gray (10YR 6/2), dense, wet	33.5				
34	SM	Fine to medium grained SILTY SAND with trace gravel, brownish gray (10YR 6/2), dense, wet	34.0	0.2	75		
35		No Recovery 35.0 - 36.0 ft		-			
36	SW-GW	SAND and GRAVEL, well graded, brownish gray (10YR 6/2), dense, wet	36.0				
37				0.2			
38					100		
39				0.2		*	Water Sample: GP-20 39'
40	CL	SILTY CLAY, gray (2.5Y 5/1), stiff, moist	40.0				
41				0.2			
42					100		
43				0.2		*	Soil Sample: GP-20 40-42
44		End of boring at 44.0 ft	44.0				

GP-20

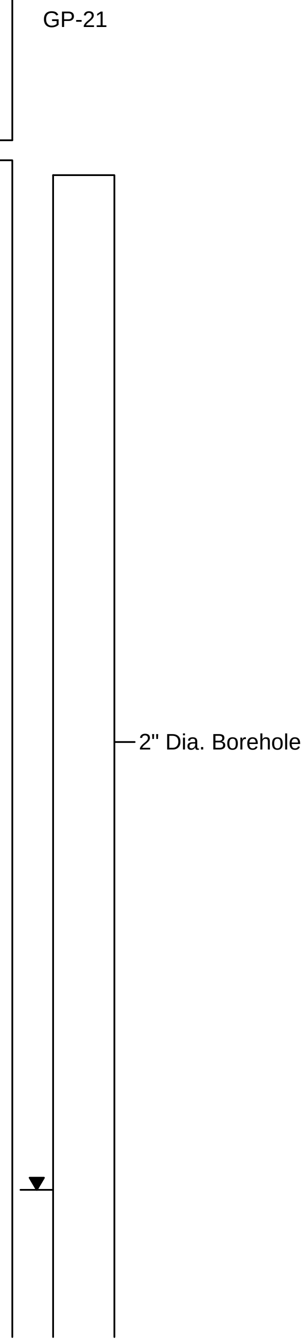
2" Dia. Borehole

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: GP-21

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/7/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/7/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 21.0 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0 – 0.5		Grass/Topsoil	.50	0.1	25		
0.5 – 4.0	CL	SILTY CLAY with gravel, dark brown (10YR 3/3), soft, dry No Recovery 1.0 - 4.0 ft	4.0	-			
4.0 – 5.0	SW	SAND with trace gravel, well graded, brown (10YR 5/3), loose, moist	5.0	0.2	50		
5.0 – 8.0	SW-GW	SAND and GRAVEL, well graded, brown (10YR 5/3), loose, moist No Recovery 6.0 - 8.0 ft	8.0	-			
8.0 – 12.0	SW-GW	SAND and GRAVEL, well graded, yellowish red (5YR 5/8), dense, moist	12.0	0.2 0.2	100		
12.0 – 13.5	SW	Fine to medium grained SAND with trace gravel, well graded, brown (10YR 5/3), dense, moist	13.5	0.2	100		
13.5 – 14.0	SW-GW	SAND and GRAVEL, well graded, yellowish red (5YR 5/8), dense, moist	14.0				
14.0 – 15.5	SW	Fine to medium grained SAND with trace gravel, well graded, brown (10YR 5/3), moist, dense	15.5	0.2			
15.5 – 20.0	SW-GW	SAND and GRAVEL, well graded, yellowish red (5YR 5/8), dense, moist	20.0	0.2 0.2	100	*	Soil Sample: GP-21 18-20'
20.0 – 24.0	SM	Fine grained SANDY SILT with trace gravel, grayish brown (10YR 5/2), dense, wet Wet at 21.0 ft		0.2 0.2	100		



REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: GP-21

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/7/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/7/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 21.0 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	GP-21
24–26.5	SM		Fine grained SANDY SILT, coarsens with depth, grayish brown (10YR 5/2), stiff, wet	26.5	0.2	100			
26.5–28	SW-GW		SAND and GRAVEL, well graded, brownish gray (10YR 6/2), dense, wet	28.0	0.2		*	Water Sample: GP-21 28'	
28–29	SW		SAND with trace gravel, well graded, grayish brown (10YR 5/2), dense, wet	29.0	0.5	50			
29–32	GW		GRAVEL, well graded, grayish brown (10YR 5/2), dense, wet No Recovery 30.0 - 32.0 ft	32.0	-				
32–36	SW-GW		SAND and GRAVEL, well graded, brownish gray (10YR 6/2), dense, wet No Recovery 35.0 - 36.0 ft	36.0	0.3 0.3 -	75			2" Dia. Borehole
36–40	SW		Fine to medium grained SAND with trace gravel, gray (2.5Y 5/1), dense, wet No Recovery 39.0 - 40.0 ft	40.0	0.4 0.3 -	75	*	Water Sample: GP-21 38'	
40–44	CL		SILTY CLAY with trace gravel, gray (2.5Y 5/1), stiff, moist	44.0	0.3 0.3	100	*	Soil Sample: GP-21 40-42	

End of boring at 44.0 ft

Depth scale: 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: GP-22

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/8/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/8/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 21.5 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0			Grass/Topsoil	.50				
1	CL		SILTY CLAY, brown (10YR 5/3), loose, dry	2.0	0.1	100		
2–4	CL		SILTY CLAY with trace gravel, brown (10YR 5/3), soft, dry	4.0	0.1			
4–5	SW-GW		SAND and GRAVEL, well graded, brown (10YR 5/3), loose, moist	5.0	0.2	50		
5–8	SW		Fine grained SAND with gravel, well graded, brown (10YR 5/3), loose, moist No Recovery 6.0 - 8.0 ft	8.0	-			
8–12	SW-GW		SAND and GRAVEL, well graded, brown (10YR 5/3) loose, moist No Recovery 10.0 - 12.0 ft	12.0	0.1 -	50		
12–13.5	SW		Fine to medium grained SAND with trace gravel, well graded, brown (10YR 5/3), loose, moist yellowish red (5YR 5/8) oxidation at 12.5 ft	13.5	0.3	50		
13.5–16	SP		Fine grained SAND, poorly graded, brown (10YR 5/3), loose, moist yellowish red (5YR 5/8) oxidation at 14.0 ft No Recovery 14.0 -16.0 ft	16.0	-			
16–17.5	SW-GW		SAND and GRAVEL, well graded, brown (10YR 5/3), dense, moist	17.5	0.2	100		
17.5–18.5	SP		Fine grained SAND, well graded, brownish gray (10YR 6/2), loose, moist	18.5				
18.5–19.5	SM		Fine grained SANDY SILT, brownish gray (10YR 6/2), soft, wet	19.5	0.2		*	Soil Sample: GP-22 18-20'
19.5–20.0	SW-GW		SAND and GRAVEL, well graded, brownish gray (10YR 6/2), loose, moist	20.0				
20–20.5	SW			20.5	0.1	75		

GP-22

2" Dia. Borehole

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: GP-22

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/8/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/8/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 21.5 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
20.5–24.0	GW	GRAVEL with trace sand, well graded, brownish gray (10YR 6/2), dense, wet Wet and becomes coarse at 21.5 ft No Recovery 23.0 - 24.0 ft		0.1 0.2 -	75	*	Water Sample: GP-22 24'
24.0–26.0	ML	SILT, brown (10YR 5/3)	26.0	0.3 0.3	63		
26.0–28.0	SW-GW	SAND and GRAVEL, well graded, brownish gray (10YR 6/2), dense, wet No Recovery 26.5 - 28.0 ft	28.0	-			
28.0–28.5	GW	GRAVEL, brownish gray (10YR 6/2), dense, wet	28.5	0.3	63		
28.5–32.0	GW	GRAVEL with trace coarse grained sand, well graded, brownish gray (10YR 6/2), dense, wet No Recovery 30.5 - 32.0 ft	32.0	0.2 -			
32.0–34.0	CL	SILTY CLAY, gray (2.5Y 5/1), stiff, wet	34.0	0.3	100	*	Water Sample: GP-22 34'
34.0–36.0	SP	Fine grained SAND, poorly graded, brownish gray (10YR 6/2), dense, wet well graded gravel seams at 34.0 and 36.0 ft	36.0	0.2			
36.0–40.0	CL	SILTY CLAY with trace gravel, gray (2.5Y 5/1), stiff, moist No Recovery 39.5 - 40.0 ft	40.0	0.2 -	88	*	Soil Sample: GP-22 36- 38'
40.5		End Of Boring at 40.0 ft.					

GP-22

2" Dia. Borehole

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: GP-23

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/8/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/8/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 20.5 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
22–24	SW	No Recovery 23.0 - 24.0 ft	24.0	0.2; -	75		
24–28	GW	GRAVEL with coarse grained sand, well graded, brownish gray (10YR 6/2), dense, wet yellowish red (5YR 5/8) silt seam at 26.0 ft No Recovery 27.0 - 28.0 ft	28.0	0.1; 0.2; -	75	*	Water Sample: GP-23 27'
28–28.5	SW	Medium to coarse grained SAND with trace gravel, yellowish red (5YR 5/8), dense, wet	28.5	0.2	63		
28.5–32	GW	GRAVEL with trace sand, well graded, yellowish red (5YR 5/8), dense, wet cobble seam from 29.5 - 30.5 ft No Recovery 30.5 - 32.0 ft	32.0	0.2; -			
32–34	GW	GRAVEL, well graded, yellowish red (5YR 5/8), dense, wet	34.0	0.1	100		
34–36	SW-GW	SAND and GRAVEL, well graded, brownish gray (10YR 6/2), dense, wet	36.0	0.1			
36–38.5	SW-GW	SAND and GRAVEL, well graded, gray (2.5Y 5/1), dense, wet	38.5	0.1	88	*	Water Sample: GP-23 37'
38.5–40	CL	SILTY CLAY with trace gravel, gray (2.5Y 5/1), stiff, moist No Recovery 39.5 - 40.0 ft	40.0	0.1		*	Soil Sample: GP-23 39-40'
		End Of Boring at 40.0 ft					

GP-23

2" Dia. Borehole

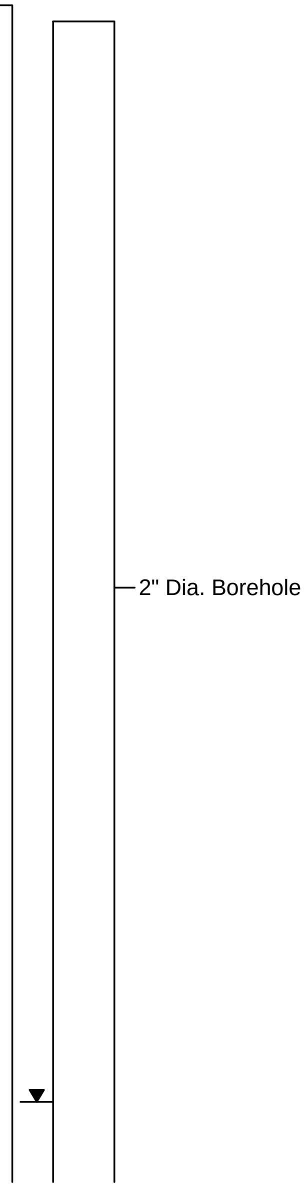
REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: GP-23

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/8/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/8/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 20.5 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0			Grass/Topsoil	.50				
1	CL		SILTY CLAY with trace gravel, brown (10YR 5/3), soft, moist		0.3	50		
3			No Recovery 2.0 - 4.0 ft	4.0	-			
4	SW-GW		SAND and GRAVEL, well graded, brown (10YR 5/3), loose, moist		0.4	75		
6					0.6			
7			No Recovery 7.0 - 8.0 ft		-			
9					0.4	75		
10					0.3			
11			No Recovery 11.0 - 12.0 ft		-			
13					0.4	75		
14			yellowish red (5YR 5/9) oxidation at 14.0 ft		0.5			
15			No Recovery 15.0 - 16.0 ft	16.0	-			
16	SW-GW		SAND and GRAVEL, well graded, brownish gray (10YR 6/2), loose, moist		0.1	75	*	Soil Sample: GP-23 17-19
17			silty clay seam at 17.0 ft		0.3			
19			No Recovery 19.0 to 20.0 ft	20.0	-			
20	SW		SAND, well graded, brownish gray (10YR 6/2), loose, wet		0.1	75		
21.5	SW		wet at 20.5 ft	21.5				

GP-23



REMARKS:
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NS = Not Surveyed

Boring/Well ID: GP-24

Mundell Consulting Professionals for the Earth and the Environment

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/12/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/12/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 22.0 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0		Grass/Topsoil	.50				
1	CL	SILTY CLAY with trace gravel, brown (10YR 5/3), soft, moist		1.3			
2					50		
3		No Recovery 2.0 - 4.0 ft		-			
4	SW-GW	SAND and GRAVEL, well graded, brown (10YR 5/3), loose, moist	4.0				
5				1.1			
6					50		
7		No Recovery 6.0 - 8.0 ft		-			
8	SW	Fine to medium grained SAND, well graded, brown (10YR 5/3), loose, moist	8.0				
9				1.0			
10	SW-GW	SAND and GRAVEL, well graded, brown (10YR 5/3), loose, moist, yellowish red (5YR 5/8) oxidation at 11.0 ft	10.0	1.0	75		
11				-			
12		No Recovery 11.0 - 12.0 ft					
13				1.0			
14				1.0	75		
15		No Recovery 15.0 - 16.0 ft		-			
16							
17				0.9			
17.5	CL	SILTY CLAY with trace sand, brownish gray (10YR 6/2), soft, moist	17.5				Soil Sample:
18	SW-GW	SAND and GRAVEL, well graded, brownish gray (10YR 6/2), loose, moist	18.0		75	*	GP-24 17-19'
19				0.7			
20				-			

GP-24

2" Dia. Borehole

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: GP-24

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/12/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/12/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 22.0 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	GP-24
20			Fine to medium grained SAND, well graded, brownish gray (10YR 6/2), loose, moist						
21	SW				0.8				
22			SAND and GRAVEL, brownish gray (10YR 6/2) loose, wet	22.0		100			
23			wet at 22.0 ft		0.9				
24									
25					0.8				
26						88			
27					0.8				
27.5			No Recovery 27.5 - 28.0 ft		-				
28							*	Water Sample: GP-24 28'	
29					0.9				
30					0.9	75			2" Dia. Borehole
31	SW-GW		No Recovery 31.0 - 32.0 ft		-				
32									
33					0.7				
34						100			
35					1.0				
36			SAND and GRAVEL, coarsens with depth, 36.0 - 40.0 ft						
37					0.9				
38						100	*	Water Sample: GP-24 38'	
39					1.0				
40									

REMARKS:
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TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: GP-24

Mundell Consulting Professionals for the Earth and the Environment

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/12/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/12/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 22.0 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS
	SHEET 3 OF 3

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	GP-24
40–44	SW-GW		SAND and GRAVEL, well graded, brownish gray (10YR 6/2), dense, wet	44.0	0.4 (40–42); 0.4 (42–44)	100			2" Dia. Borehole
44–48			Sand heave refusal at 44.0 ft End Of Boring at 44.0 ft Pushed to 48.0 ft to collect a water sample from the deep saturated zone	48.0		0	*	Water Sample: GP-24 48'	

Depth scale: 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: GP-25

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/9/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/9/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 20.0 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0			Grass/Topsoil	.50				
1	CL		SILTY CLAY with trace gravel, brown (10YR 5/3), soft, moist		0.1	50		
3			No Recovery 2.0 - 4.0 ft		-			
4	SW-GW		SAND and GRAVEL, well graded, brown (10YR 5/3), loose, moist	4.0	0.1	25		
6			No Recovery 5.0 - 8.0 ft		-			
8			Fine to medium grained sand seam at 8.0 ft		0.2	25		
10			No Recovery 9.0 - 12.0 ft		-			
13			yellowish red (5YR 5/8) oxidation from 12.0 - 14.0 ft		0.2	100		
14	ML		SILT with trace gravel, brownish gray (10YR 6/2), soft, moist		0.2			
17					0.1	100		
17.5	SW-GW		SAND and GRAVEL, well graded, brownish gray (10YR 6/2), loose, moist	17.5				
19			Yellowish red (5YR 5/8) oxidation from 17.5 - 20.0 ft		0.2		*	Soil Sample: GP-25 18-20'
20			silty, wet at 20.0 - 20.5 ft					

GP-25

2" Dia. Borehole

REMARKS:
BGS = Below Ground Surface
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TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: GP-25

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/9/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/9/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 20.0 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
20–25.5	SW-GW	No Recovery 22.5 - 24.0 ft	25.5	0.3; 0.3; -; 0.2	63		
25.5–28	SM	Fine grained SILTY SAND with some gravel, brownish gray (10YR 6/2), dense, wet No Recovery 26.0 - 28.0 ft	28.0	-	50	*	Water Sample: GP-25 28'
28–32	SW-GW	SAND and GRAVEL, well graded, brownish gray (10YR 6/2), wet SILTY SAND, brown (10YR 5/3) 29.0 - 29.5 ft Coarse grained SAND and GRAVEL, well graded, brownish gray (10YR 6/2), coarse gravel seam at 29.5 ft	32.0	0.2; 0.2	100		
32–38		Sand heave refusal at 32.0 ft End Of Boring at 32.0 ft. Pushed to 38.0' to collect a water sample from the deep saturated zone	38.0		0	*	Water Sample: GP-25 38'

GP-25

2" Dia. Borehole

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: GP-26

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/9/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/9/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 20.0 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0		Grass/Topsoil	.50				
1	CL	SILTY CLAY with trace gravel, brown (10YR 5/3), soft, moist		0.1	50		
3		No Recovery 2.0 - 4.0 ft	4.0	-			
4	SW-GW	SAND and GRAVEL, well graded, brown (10YR 5/3), dense, moist	5.0	0.1	100		
5	SW	Fine to medium grained SAND, brown (10YR 5/3), dense, moist	6.0				
6	SW-GW	SAND and GRAVEL, well graded, brown (10YR 5/3), dense, moist	8.0	0.1			
8	CL	SILTY CLAY with some gravel, brown (10YR 5/3), stiff, moist; fine sand seam at 9.0 ft; yellowish red (5YR 5/8) oxidation at 9.0, 10.0, and 11.0 ft; Color change to brownish gray (10YR 6/2) at 12.0 ft	12.0	0.1 / 0.1	100		
12	SW-GW	SAND and GRAVEL, well graded, brown (10YR 5/3), loose, moist; No Recovery 15.0 - 16.0 ft	16.0	0.1 / 0.1 / -	75		
16	SW	Fine to medium grained SAND with trace gravel, well graded, brown (10YR 5/3), dense, moist	17.0	0.1	100		
17	SW-GW	SAND and GRAVEL, well graded, brown (10YR 5/3), dense, moist; Wet at 20.0 ft		0.2		*	Soil Sample: GP-26 18-20'
20							

GP-26

2" Dia. Borehole

REMARKS:
BGS = Below Ground Surface
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TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: GP-26

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/9/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/9/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 20.0 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
20–23	SW-GW	Color change to brownish gray (10YR 6/2) from 20.0 - 23.0 ft No Recovery 23.0 - 24.0 ft	24.0	0.2 0.2 -	75		
24–27	CL	SILTY CLAY with trace gravel, gray (2.5Y 5/1), stiff, moist	27.0	0.1 0.0	100	*	Water Sample: GP-26 25'
27–28	SM	Fine grained SILTY SAND, poorly graded, brownish gray (10YR 6/2), dense, wet	28.0				
28–32		Sand heave refusal at 28.0 ft SILTY SAND, gray (2.5Y 5/1), very dense, moist, in shoe End of Boring at 28.0 ft. Pushed to 32.0 ft to collect a water sample from the deep saturated zone	32.0	0.1	0	*	Water Sample: GP-26 32'

GP-26

2" Dia. Borehole

REMARKS:
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NS = Not Surveyed

Boring/Well ID: GP-27

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/8/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/9/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 19.5 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS
	SHEET 1 OF 3

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	GP-27
0		Grass/Topsoil	.50					
1	SW-GW	SAND and GRAVEL, well graded, brown (10YR 5/3), loose, moist		0.0				
2	CL	SILTY CLAY, brown (10YR 5/3), soft, moist	2.0	0.0	75			
3		No Recovery 3.0 - 4.0 ft		-				
4	SW	Fine grained SAND with trace gravel, well graded, brown (10YR 5/3), loose, moist	4.0					
5	SW-GW	SAND and GRAVEL, well graded, brown (10YR 5/3), loose, moist	5.0	0.1				
6					50			
7		No Recovery 6.0 - 8.0 ft		-				2" Dia. Borehole
8								
9				0.1				
10				0.1	75			
11		No Recovery 11.0 - 12.0 ft		-				
12								
13				0.1				
13.5	ML	SILT with some gravel, well graded, brown (10YR 5/3), stiff, moist	13.5		88			
14		Color change to gray (2.5Y 5/1) 14.5 - 15.5 ft		0.1				
15								

REMARKS:
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TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: GP-27

Mundell Consulting Professionals for the Earth and the Environment

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/8/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/9/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 19.5 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS
	SHEET 2 OF 3

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
15				0.1			
	ML	No Recovery from 15.5 - 16.0 ft		-	88		
16	SW	Medium grained SAND with some gravel, well graded, brownish gray (10YR 6/2), dense, moist	16.0				
17				0.1			
18					100		
19				0.1		*	Soil Sample: GP-27 17-19'
20	SW-GW	SAND and GRAVEL, well graded, brownish gray (10YR 6/2), dense Wet at 19.5 ft	19.5				
21				0.1			
22					100		
23				0.1			
24		Medium grained SAND and GRAVEL, brown (10YR 5/3), dense, moist	24.0				
25	SW-GW			0.1			
26		SAND and GRAVEL, well graded, brown (10YR 5/3), dense, moist	26.0		100	*	Water Sample: GP-27 26'
27	SW-GW			0.1			
28		SILT with gravel, gray (2.5Y 5/1), stiff, moist	28.0				
29	SM			0.4	75		
30		Well graded SAND and GRAVEL seam at 30.0 ft					

GP-27

19.5

2" Dia. Borehole

REMARKS:
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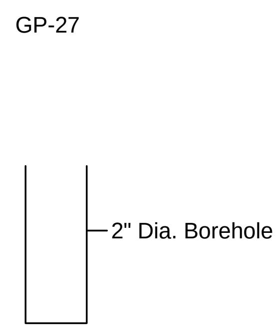
Boring/Well ID: GP-27

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/8/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/9/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 19.5 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS
	SHEET 3 OF 3

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
30–32	SM		No Recovery 31.0 - 32.0 ft	32.0	0.1 / -	75		
32–36			Refusal at 32.0 ft, dense gravel in shoe. End of Boring at 32.0 ft Offset 5.0 ft and attempted to advance beyond 32 ft. Encountered refusal at 16.0 ft. Pushed to 36.0 ft to collect a water sample from the deep saturated zone			0	*	Water Sample: GP-27 36'



REMARKS:
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TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: GP-28

Mundell Consulting Professionals for the Earth and the Environment

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/9/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/9/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 20.0 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0		Grass/Topsoil	.50				
1	CL	SILTY CLAY with some sand and gravel, brown (10YR 5/3), soft, moist	1.5	0.9			
2					75		
3	SW-GW	No Recovery 3.0 - 4.0 ft		-			
4		SAND and GRAVEL, well graded, brown (10YR 5/3), loose, moist; No Recovery 2.0 - 4.0 ft	4.5				
5	SW	Medium to coarse grained SAND with trace gravel, well graded, brown (10YR 5/3), loose, moist; yellowish red (5YR 5/8) oxidation from 4.5 -5.5 ft	5.5	0.8			
6				1.0	75		
7		SAND and GRAVEL, well graded, brown (10YR 5/3), loose, moist		-			
8	SW-GW	No Recovery 7.0 - 8.0 ft					
9				0.9			
10			10.5	0.9	75		
11	SW	Fine to medium grained SAND with some gravel, well graded, brown (10YR 5/3), loose, moist; yellowish red (5YR 5/8) oxidation from 10.5 - 11.0 ft		-			
12		No Recovery 11.0 - 12.0 ft	12.0				
13	SW-GW	SAND and GRAVEL, well graded, brown (10YR 5/3), loose, moist		0.7			
14		SAND with trace gravel, well graded, brown (10YR 5/3), dense, moist	14.0	0.8	75		
15		No Recovery 15.0 - 16.0 ft		-			
16	SW	yellowish red (5YR 5/8) oxidation from 16.0 - 18.0 ft					
17				0.7			
18		Medium to coarse grained SAND and GRAVEL, well graded, brownish gray (2.5Y 5/1), moist	18.0	0.6	100		Soil Sample:
19	SW-GW					*	GP-28 17-19'
20				-			

GP-28

2" Dia. Borehole

REMARKS:
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Boring/Well ID: GP-28

Mundell Consulting Professionals — for the Earth and the Environment

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/9/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/9/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 20.0 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
20–21	SW-GW		SAND and GRAVEL, well graded, gray (2.5Y 5/1), dense, wet	21.0	0.6	75		
21–22	SW-GW		Wet at 20.0 ft Medium to coarse grained SAND and GRAVEL, gray (2.5Y 5/1), dense, wet	22.0	0.7			
22–24	SW-GW		SAND and GRAVEL, well graded, gray (2.5Y 5/1), dense, wet No Recovery 23.0 - 24.0 ft	24.0	-			
24–25.5	GW		GRAVEL, well graded, gray (2.5Y 5/1), dense, wet	25.5	0.4	100		
25.5–26.5	CL		SILTY CLAY with some gravel, brownish gray (10YR 6/2), stiff, moist	26.5	0.8			
26.5–32	SM-GM		SILTY SAND and GRAVEL, brownish gray (10YR 6/2), dense, wet No Recovery 30.0 - 32.0 ft	32.0	0.8 -	50		Water Sample: GP-28 28'
32–35	SM-GM		Silty SAND and GRAVEL, gray (2.5Y 5/1), dense, wet	35.0	0.9	100		
35–36	SW		Fine to coarse grained SAND, gray (2.5Y 5/1), very dense, wet	36.0	0.9			
36–38.5			Sand heave refusal at 36.0 ft End of Boring at 36.0 ft Pushed to 38.5 ft to collect a water sample from the deep saturated zone			0	*	Water Sample: GP-28 38.5'

Depth scale: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40

GP-28

2" Dia. Borehole

REMARKS:
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USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: GP-29

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/14/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/14/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 18.0 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0			Grass/Topsoil	.50				
1	CL		SILTY CLAY with trace gravel, brown (10YR 5/3), soft, moist	1.0	0.2	50		
2	SW-GW		SAND and GRAVEL, well graded, brown (10YR 5/3), loose, moist					
3			No Recovery 2.0 - 4.0 ft		-			
5					0.3			
6			yellowish red (5YR 5/8) oxidation from 4.0 - 7.0 ft		0.2	75		
7			No Recovery 7.0 - 8.0 ft		-			
9			Fine to medium grained sand seam at 9.0 ft		0.2			
10			gray (2.5Y 5/1), at 9.5 ft			50		
11			No Recovery 10.0 - 12.0 ft		-			
12.5					0.2			
14	SW		Fine to medium grained SAND, well graded, brownish gray (10YR 6/2), loose, moist	13.5	-	63		
15			No Recovery 14.5 - 16.0 ft		0.1			
16							*	Soil Sample: GP-29 16-18'
17					0.1			
18			Wet at 18.0 ft			88		
19					0.1			
20			No Recovery 19.5 - 20.0 ft		-			

GP-29

2" Dia. Borehole

REMARKS:
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Boring/Well ID: GP-29

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/14/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/14/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 18.0 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	GP-29
20–23	SW				0.1 (20–22); 0.1 (22–24)	100			2" Dia. Borehole
23–25.5	SW-GW		SAND and GRAVEL, well graded, brownish gray (10YR 6/2), loose, wet	23.0					
25.5–28	SW		Fine to medium grained SAND with trace gravel, brownish gray (10YR 6/2), dense, wet	25.5	0.1 (24–26); 0.1 (26–28)	100			
28–30			Sand heave refusal at 28.0 ft End of Boring at 28.0 ft	28.0		0	*	Water Sample: GP-29 30'	
30–40			Pushed to 30.0 ft to collect a water sample from the intermediate saturated zone	30					
30–40			Pushed to 40.0 ft to collect a water sample from the deep saturated zone			0	*	Water Sample: GP-29 40'	

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Boring/Well ID: GP-30

Mundell Consulting Professionals for the Earth and the Environment

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/13/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/13/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 18.5 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0 – 0.5		Grass/Topsoil	.50				
0.5 – 5.0	CL	SILTY CLAY with trace sand, brown (10YR 5/3), loose, moist Hand augered to 5.0 ft	5.0	0.2 0.2	100		
5.0 – 12.0	SW-GW	SAND and GRAVEL, well graded, brown (10YR 5/3), loose, moist yellowish red (5YR 5/8) oxidation from 5.0 - 10.5 ft No Recovery 10.5 - 12.0 ft	12.0	0.3 0.4 0.4 0.4 -	100 63		
12.0 – 13.0	SW	SAND with trace gravel, well graded, brown (10YR 5/3), dense, moist	13.0	0.5			
13.0 – 16.0	SW-GW	SAND and GRAVEL, well graded, brown (10YR 5/3), dense, moist yellowish red (5YR 5/8) oxidation from 13.0 -16.0 ft Fine to medium grained SAND seam with trace gravel	16.0	1.4	100		
16.0 – 17.5	SW-GW	SAND and GRAVEL, well graded, brownish gray (10YR 6/2), loose, moist	17.5	0.6	88	*	Soil Sample: GP30 16-18'
17.5 – 20.0	SW	Fine to medium grained SAND, well graded, brownish gray (10YR 6/2), loose, moist Wet at 18.5 ft No Recovery 19.5 - 20.0 ft		0.3 -			

GP-30

2" Dia. Borehole

REMARKS:
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Boring/Well ID: GP-30

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/13/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/13/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 18.5 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	GP-30
20	SW-GW	SAND and GRAVEL, well graded, brownish gray (10YR 6/2), loose, wet						
21				1.2	63			
22		Becomes finer grained with depth to 22.5 ft		2.2				
23		No Recovery 22.5 -24.0 ft		-				
24		No longer becoming finer grained with depth		2.4	50			
25				1.4		*	Water Sample: GP-30 25'	
26								
27		No Recovery 26.0 - 28.0 ft		-				
28				1.5	25			2" Dia. Borehole
29								
30				-				
31		No Recovery 29.0 - 32.0 ft						
32				2.5	88			
33								
34				2.0		*	Water Sample: GP-30 35'	
35	CL	SILTY CLAY with trace sand, gray (2.5Y 5/1), very stiff	35.0					
36		No Recovery 35.5 -36.0 ft	36.0	-		*	Soil Sample: GP-30 34-35.5'	
37		End of Boring at 36.0 ft						
38								
39								
40								

REMARKS:
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NS = Not Surveyed

Boring/Well ID: GP-31

Mundell Consulting Professionals for the Earth and the Environment

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/13/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/13/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 18.5 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0			Grass/Topsoil	.50				
1	CL		SILTY CLAY with trace sand, brown (10YR 5/3), loose, moist		0.2			
2			Hand augered to 5.0 ft			100		
3								
4					0.2			
5								
6	SW-GW		SAND and GRAVEL, well graded, brown (10YR 5/3), loose, moist	6.0	0.3	75		
7			yellowish red (5YR 5/8) oxidation from 6.0 - 7.5 ft		-			
8			No recovery 7.0 - 8.0 ft					
9					0.4			
10	SW-GW		SAND and GRAVEL, well graded, brown (10YR 5/3), loose, moist	9.5	0.4	63		
11			No Recovery 10.5 - 12.0 ft		-			
12	SW-GW		SAND and GRAVEL, well graded, brown (10YR 5/3), dense, moist	12.0	0.5			
13			yellowish red (5YR 5/8) oxidation from 12.0 - 14.5 ft		0.7			
14						63		
15			No Recovery 14.5- 16.0 ft		-			
16	SW		SAND, well graded, brown (10YR 5/3), loose, moist	16.0			*	Soil Sample: GP-31 16-17.5'
17			silty sand seam at 16.5 ft		2.1			
18	SW		SAND, well graded, brown (10YR 5/3), dense, wet	17.5		75		
18.5			Wet at 18.5 ft		1.1			
19			No Recovery 19.0 - 20.0 ft		-			
20								

GP-31

2" Dia. Borehole

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: GP-31

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/13/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/13/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 18.5 ft
BORING LOCATION: Cemetery	SURFACE ELEVATION: NS

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	GP-31
20			SAND and GRAVEL, well graded, brownish gray (10YR 6/2), loose, wet						
21			Well graded sand seam at 21.5 ft		4.1				
22					2.2	75			
23			No Recovery 23.0 -24.0 ft		-				
24									
25					1.5				
26	SW-GW					88	*	Water Sample: GP-31 26'	2" Dia. Borehole
27			No recovery 27.5 - 28.0 ft		1.4				
28					-				
29					0.4				
30						100			
31					0.5				
32			End of Boring at 32.0 ft due to lost geoprobe tooling	32.0					
33									
34						0			
35			Pushed to 36.0 ft to collect a water sample from the deep saturated zone				*	Water Sample: GP-31 36'	
36									
37									
38									
39									
40									

REMARKS:
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MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-A-01

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: Boring is 14' west and 1' north of NW corner of Building 2
FIELD GEOLOGIST: Leena Lothe/Chris Jaros/Megan Hill
NOTES:

DATE BEGAN: 09/26/05
DATE FINISHED: 09/26/05
DRILLING METHOD: HSA with 4' Geoprobe Sampler
DRILL EQUIP: Geoprobe 5410
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 40'
TOP OF CASING ELEVATION:
SURFACE ELEVATION: N/A
COMMENTS: Soil screening 0-10', GW only below 10'

Lithologic Description	USCS Symbol	Stratum Depth(feet)	Blow Counts	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Well Completion Diagram
TOPSOIL: GRASS top 4", TOPSOIL to 6"								0.0	
SP: FINE SAND with trace pebbles, little clay, brown (10 YR 4/3), dry, no odor	SP	0.5		0.1					
				0.1					
				1.4	75%				
				1.3					
				2.2		●	GP-A-01 (4-5')	5.0	
SW: CLAYEY SAND, slight orange (10 YR 6/8), dry, no odor	SW	5		1.6					
				0.9					
				0.9	90%				
- Trace to some gravel @ 8'				0.8					
SP: SP with trace gravel, dry, no odor	SP	9		1.1					
		10						10.0	
- Blind drilling below 10' to collect ground water samples									
								15.0	▼
						●	GP-A-01 (16-20')		
								20.0	
								25.0	
						●	GP-A-01 (26-30')		
								30.0	
								35.0	
						●			

MUNDELL & ASSOCIATES, INC.
BORING LOG

BORING NO: GP-A-01

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: Boring is 14' west and 1' north of NW corner of Building 2
FIELD GEOLOGIST: Leena Lothe/Chris Jaros/Megan Hill
NOTES:

DATE BEGAN: 09/26/05
DATE FINISHED: 09/26/05
DRILLING METHOD: HSA with 4' Geoprobe Sampler
DRILL EQUIP: Geoprobe 5410
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 40'
TOP OF CASING ELEVATION:
SURFACE ELEVATION: N/A
COMMENTS: Soil screening 0-10', GW only below 10'

Lithologic Description	USCS Symbol	Stratum Depth(feet)	Blow Counts	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Well Completion Diagram
							GP-A-01 (36-40')		
- End of Boring at 40'								40.0	

MUNDELL & ASSOCIATES, INC.
BORING LOG

BORING NO: GP-A-02

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION:
FIELD GEOLOGIST: Leena Lothe/Chris Jaros/Megan Hill
NOTES:

DATE BEGAN: 09/26/05

DATE FINISHED: 09/26/05
DRILLING METHOD: HSA with 4' Geoprobe Sampler
DRILL EQUIP: Geoprobe 5410
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 40'
TOP OF CASING ELEVATION:
SURFACE ELEVATION: N/A
COMMENTS: Soil screening 0-10', GW only below 10'

Lithologic Description	USCS Symbol	Stratum Depth(feet)	Blow Counts	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Well Completion Diagram
TOPSOIL: GRASS top 2", TOPSOIL to 6"								0.0	
CL: SILTY CLAY with trace to some sand, very dark gray (10 YR 3/1), dry, no odor		0.5		0.8, 0.4, 1.9	85%				
CL: CLAY with trace to some sand, dark brown (10 R 2.5/2)	CL	3		1.3, 0.6, 0.7, 0.6	90%			5.0	
SW: FINE TO MEDIUM SAND with trace to some medium gravel - light gray (2.5 Y 7/2) powdery texture, no odor	SW	7		3.9, 1.4, 1.3		✱	GP-A-02 (7-8')		
- Blind drilling below 10' to collect ground water samples		10		0.8, 0.7	75%			10.0	
								15.0	▼
						✱	GP-A-02 (16-20')	20.0	
								25.0	
						✱	GP-A-02 (26-30')	30.0	
								35.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-A-02

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION:
FIELD GEOLOGIST: Leena Lothe/Chris Jaros/Megan Hill
NOTES:

DATE BEGAN: 09/26/05
DATE FINISHED: 09/26/05
DRILLING METHOD: HSA with 4' Geoprobe Sampler
DRILL EQUIP: Geoprobe 5410
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 40'
TOP OF CASING ELEVATION:
SURFACE ELEVATION: N/A
COMMENTS: Soil screening 0-10', GW only below 10'

Lithologic Description	USCS Symbol	Stratum Depth(feet)	Blow Counts	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Well Completion Diagram
- End of Boring at 40'								40.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-A-03

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: Boring is on SE side (grassy area) of Bldg 6
FIELD GEOLOGIST: Leena Lothe/Chris Jaros/Megan Hill
NOTES:

DATE BEGAN: 09/30/05
PAGE 1 OF 1
DATE FINISHED: 09/30/05
DRILLING METHOD: HSA with 4' Geoprobe Sampler
DRILL EQUIP: Geoprobe 5410
GW DEPTH (OBSERVED): 16-20'
DEPTH OF BORING: 20'
TOP OF CASING ELEVATION:
SURFACE ELEVATION: N/A
COMMENTS: Shallow GW samples, no soil screening

Lithologic Description	USCS Symbol	Stratum Depth(feet)	Blow Counts	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Well Completion Diagram
Blind Drilled upto 20'								0.0	
								5.0	
								10.0	
								15.0	
End of Boring at 20'						✱	GP-A-03 (20')	20.0	▼

MUNDELL & ASSOCIATES, INC.
BORING LOG

BORING NO: GP-A-04

CLIENT: AIMCO	**DATE BEGAN:** 09/26/05 PAGE 1 OF 1
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED:** 09/26/05
PROJECT NAME: Michigan Meadows	**DRILLING METHOD:** HSA with 4' Geoprobe Sampler
PROJECT NO: M01046	**DRILL EQUIP:** Geoprobe 5410
DRILLING CONTRACTOR: Midway Services, Inc.	**GW DEPTH (OBSERVED):** 16-20'
DRILLER: Mark Hicks	**DEPTH OF BORING:** 20'
BORING LOCATION: Boring is on SW side (grassy area) of Bldg 6	**TOP OF CASING ELEVATION:**
FIELD GEOLOGIST: Leena Lothe/Chris Jaros/Megan Hill	**SURFACE ELEVATION:** N/A
NOTES:	**COMMENTS:** Shallow GW samples, no soil screening

Lithologic Description	USCS Symbol	Stratum Depth(feet)	Blow Counts	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Well Completion Diagram
Blind Drilled upto 20'								0.0	
								5.0	
								10.0	
								15.0	
End of Boring at 20'							GP-A-03 (20')	20.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG **BORING NO:** GP-A-05

PAGE 1 OF 1

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: Boring is on NW side (grassy area) of Bldg 6
FIELD GEOLOGIST: Leena Lothe/Chris Jaros/Megan Hill
NOTES:

DATE BEGAN: 09/30/05
DATE FINISHED: 09/30/05
DRILLING METHOD: HSA with 4' Geoprobe Sampler
DRILL EQUIP: Geoprobe 5410
GW DEPTH (OBSERVED): 16-20'
DEPTH OF BORING: 20'
TOP OF CASING ELEVATION:
SURFACE ELEVATION: N/A
COMMENTS: Shallow GW samples, no soil screening

Lithologic Description	USCS Symbol	Stratum Depth(feet)	Blow Counts	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Well Completion Diagram
Blind Drilled upto 20'								0.0	
								5.0	
								10.0	
								15.0	
End of Boring at 20'							GP-A-03 (20')	20.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-A-06

PAGE 1 OF 1

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: Southwest of Building 10
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 1 GW sample: GP-A-06 (20'); SS: 19-20'

DATE BEGAN: 1/11/07
DATE FINISHED: 1/11/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 18'
DEPTH OF BORING: 20.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
			0.1				0.0	
- blind drilled			0.1					
(See Boring log for Geoprobe GP-A-09 for the nearest soil description)			0.1					
			0.1					
			0.1				5.0	
			0.1					
			0.1					
			0.1					
			0.1					
			0.1				10.0	
			0.1					
			0.1					
			0.1					
			0.1					
			0.1				15.0	
			0.1					
			0.1					
			0.1					▼
			0.1		✷			
			0.1		✷		20.0	
- End of Boring at 20'								

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-A-07

PAGE 1 OF 1

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: Northwest of Building 10
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 1 GW sample: GP-A-07 (16'); SS: 11-12'

DATE BEGAN: 1/12/07
DATE FINISHED: 1/12/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 16.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
							0.0	
- blind drilled								
(See Boring log for Geoprobe GP-A-09 for nearest soil description)								
							5.0	
							10.0	
							15.0	
- End of Boring at 16'								

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-A-08

PAGE 1 OF 1

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: West of Building 9
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 1 GW sample: GP-A-08 (16'); SS: 14-15'

DATE BEGAN: 1/12/07
DATE FINISHED: 1/12/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 16.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
- blind drilled (See Boring log for Geoprobe GP-A-09 for the nearest soil description)							0.0	
							5.0	
							10.0	
					✱		15.0	
- End of Boring at 16'					✱			▼

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-A-09

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: Southeast of Building 13
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 1 GW sample: GP-A-09 (20'); SS: 15-17'

DATE BEGAN: 1/12/07
DATE FINISHED: 1/12/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 18'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
ASPHALT: approximately 3" of ASPHALT							0.0	
FILL: 2-3" of FILL gravel, BASE COURSE		0.50	0.1					
SW: FINE TO MEDIUM SAND with trace gravel and silt, yellowish brown (10 YR 4/4), dry, no odor	SW		0.1	90%				
			0.1					
- slight black color @ 3'			0.1					
			0.1					
- orange color @ 4'			0.1	80%			5.0	
SP: FINE TO MEDIUM SAND with trace silt and gravel, dry, no odor	SP	6.0	0.1					
			0.1					
			0.1					
			0.1	75%				
			0.1				10.0	
			0.1					
CL: SILTY CLAY with trace sand, grey color, no odor	CL	11.5	0.1					
- iron-orange color - possible brick			0.1	50%				
			0.1					
SW: FINE TO MEDIUM SAND with trace gravel, dry, no odor	SW	15.0	0.1				15.0	
			0.7		✱			
			0.1	60%				▼
			0.1					
			0.1					
- End of Boring at 20'		20.0			✱		20.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-C-01

PAGE 1 OF 1

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: West side of Olin Ave. North of Cossell Rd.
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 1 GW sample: GP-C-01 (20'); 2 SS: 7-8", 18-19'

DATE BEGAN: 1/12/07
DATE FINISHED: 1/12/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 19'
DEPTH OF BORING: 20'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
ASPHALT: 3" of ASPHALT		0.25	0.1	75%			0.0	
FILL: 9" of FILL gravel, BASE COURSE		1.00	0.1					
CL: SILTY CLAY with trace sand, dark gray (10 yr 3/1), slightly moist	CL		0.1					
			0.1					
			0.1	50%				
			0.1				5.0	
			0.1					
			2.1		✷			
SW: FINE TO COURSE SAND with trace to some fine with occasional orange color (2.5 yr 5/8)	SW	7.50	0.1	50%				
			0.1					
			4.4				10.0	
- Black staining observed (10 yr 2/1) @ 8'			2.7					
			0.1					
SP: FINE TO MEDIUM SAND with trace silt and gravel	SP	13.00	0.1	50%				
			2.6					
			0.1				15.0	
			0.7					
SW: FINE TO COURSE SAND with trace silt and gravel, slightly moist, no odor	SW	17.00	0.1	60%				
			0.1		✷			▼
			0.1		✷		20.0	
- End of Boring at 20'		20.00						

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-C-02

PAGE 1 OF 1

CLIENT: AIMCO	**DATE BEGAN:** 1/12/07
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED:** 1/12/07
PROJECT NAME: Michigan Meadows	**DRILLING METHOD:** Direct Push
PROJECT NO: M01046	**DRILL EQUIP:** Geoprobe 5400
DRILLING CONTRACTOR: Midway Services, Inc.	**GW DEPTH (OBSERVED):** 19'
DRILLER: Mark Hicks	**DEPTH OF BORING:** 20.0'
BORING LOCATION: Northwest corner of Olin Ave. and Cossell Rd. intersection	**TOP OF CASING ELEVATION:** N/A
FIELD GEOLOGIST: Leena Lothe & April Nelson	**SURFACE ELEVATION:** N/A
NOTES: 1 GW sample: GP-C-02 (20'); SS: 15-16'	**COMMENTS:**

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
							0.0	
- blind drilled								
(See Boring log GP-C-01 for nearest soil description)								
							5.0	
							10.0	
							15.0	
					✱			
								▼
- End of Boring at 20'					✱		20.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-C-03

PAGE 1 OF 1

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: Northwest corner of Olin Ave. and Cossell Rd. intersection
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 1 GW sample: GP-C-03 (20'); SS: 14-15'

DATE BEGAN: 1/15/07
DATE FINISHED: 1/15/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 19'
DEPTH OF BORING: 20'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
TOPSOIL: with Grass and roots, dark brown (7.5 yr 3/2)			0.1				0.0	
			0.1					
CL: SILTY CLAY with trace sand, brown (10 yr 3/2),slightly moist with occasional orange color	CL	2.0	0.1	60%				
			0.1					
			0.1					
- 6" course gravel @ 6'			0.1				5.0	
			0.1	60%				
			0.1					
			0.1					
			0.1					
SP: FINE TO MEDIUM SAND with trace silt and gravel (10 yr 5/4), slightly moist, no odor	SP	10.0	0.1	60%			10.0	
SW: FINE TO COURSE SAND with trace to some fine, (2.5 yr 5/4) with occasional orange color (7.5 yr 5/8)	SW	11.0	0.1					
			0.1					
			0.1					
			0.5	50%	✱			
- 6" course gravel @ 14'			0.1				15.0	
			0.1					
			0.1					
			0.1	60%				▼
			0.1					
- End of Boring at 20'		20.0			✱		20.0	

MUNDELL & ASSOCIATES, INC.
BORING LOG

BORING NO: GP-C-04

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: North of Cossell Rd. and West of GP-C-03
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 1 GW sample: GP-C-04 (20'); SS: 15-16'

DATE BEGAN: 1/15/07
DATE FINISHED: 1/15/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 19'
DEPTH OF BORING: 20.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
							0.0	
- blind drilled								
(See Boring log GP-C-05 for nearset soil description)								
							5.0	
							10.0	
							15.0	
					✱			
								▼
					✱		20.0	
- End of Boring at 20'								

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-C-05

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: North of Cossell Rd. and West of GP-C-04
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 1 GW sample: GP-C-05 (20'); SS: 17-19'

DATE BEGAN: 1/15/07
DATE FINISHED: 1/15/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 19'
DEPTH OF BORING: 20'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
TOPSOIL: with Grass and roots, dark brown (7.5 yr 3/2) - 2" black material (5 yr 2.5/1), possibly asphalt			0.1 0.5	75%			0.0	
CL: SANDY CLAY turning to SILTY CLAY, from dark brown (10 yr 4/2) to light brown (10 yr 3/4)	CL	2.0	0.1 0.1 0.1 0.1 2.0	50%			5.0	
SW: FINE TO COURSE SAND with occasional orange color (7.5 yr 5/8) - course gravel @ 10'	SW	7.0	0.5 0.1 0.1 0.2 0.3 0.1 0.1 0.1 0.1 0.1 8.0 3.4 1.4	50% 50% 60%			10.0 15.0	
- End of Boring at 20'		20.0					20.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-C-06

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway
DRILLER: Mark Hicks/ Zack
BORING LOCATION:
FIELD GEOLOGIST: Leena Lothe & Gabriel Herbert
NOTES: SS:GP-C-06 (22')(30')(40')(50')

DATE BEGAN: 7/31/08
DATE FINISHED: 7/31/08
DRILLING METHOD: Geoprobe/ Direct Push
DRILL EQUIP: Geoprobe
GW DEPTH (OBSERVED): 20'
DEPTH OF BORING: 50'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Readings	Rec. %	Sample Location	Sample ID	Depth (feet)	Notes
TOPSOIL: grass (2")							0.0	
CL: silty clay w/ trace to some sand, slightly moist, slight organic odor, dark yellowish brown (10YR 3/4)	CL		1.2	60%				
			1.4					
		6'	NR	55%			5.0	
SW: fine to medium sand w/ race gravel, dry, no odor (10 YR 3/4)	SW		0.7					
		10'	NR	45%				
SP: fine to medium sand w/ trace to some gravel, dry, no odor, strong brown (7.5 YR 4/6)	SP		0.8				10.0	
			1.5	60%				
			0.5				15.0	
			1.2	80%				
orange color at 18'			1.2					

Description	Soil	Depth mark	PID	Recovery	Sample ID	Depth (ft)
wet at 20'						20.0
			4.5			
				75%	GP-C-06 (22')	
			3.2			
		24'				
			1.2			25.0
	SW			80%		
			1.4			
SW: very hard gravel @ 28-29', very coarse to medium sand w/ some gravel, no odor, wet						
Gravel: Hard gravel, could not drill beyond 30'					GP-C-06 (30')	30.0
						35.0
	Gravel					
					GP-C-06 (40')	40.0
		42'				
hard pan probably at 42'						
						45.0

End of Boring

GP-C-06 (50')

50.0

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-C-07

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway
DRILLER: Mark Hicks
BORING LOCATION:
FIELD GEOLOGIST: Leena Lothe & Gabriel Herbert
NOTES: SS:GP-C-07 (16')(19')(24')

DATE BEGAN: 7/31/08
DATE FINISHED: 7/31/08
DRILLING METHOD: Geoprobe/ Direct Push
DRILL EQUIP: Geoprobe
GW DEPTH (OBSERVED):
DEPTH OF BORING: 24'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Readings	Rec. %	Sample Location	Sample ID	Depth (feet)	Notes
GC: brown silt, (10YR 4/3)			1.3	75%			0.0	
	BC		2.3					
		6'	1.2	60%			5.0	
SP: fine to med sand w/ trace gravel, dry, slight odor (10YR 5/8)			1.8					
	SP	10'	1.7	80%				
SW: slight odor (10YR 4/4) at 10'	SW	12'	0.9				10.0	
gravel layer, slight odor at 12'	Gravel		1.3					
black color, orange color, sugar odor, dry (10YR 5/6) at 15'		15'	3.5				15.0	
			1.6			GP-C-07 (16')		
			1.8			GP-C-07 (18')		

wet at 20'		20'				20.0
			1.8			
			0.6			
End of Boring					GP-C-07 (24')	
						25.0
						30.0

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-C-08

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway
DRILLER:
BORING LOCATION:
FIELD GEOLOGIST: Leena Lothe & Gabriel Herbert
NOTES: SS:GP-C-08 (6')(20')(24')

DATE BEGAN: 7/31/08
DATE FINISHED: 7/31/08
DRILLING METHOD: Geoprobe/ Direct Push
DRILL EQUIP:
GW DEPTH (OBSERVED): 20'
DEPTH OF BORING: 24'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Readings	Rec. %	Sample Location	Sample ID	Depth (feet)	Notes
GRASS: grass, topsoil 1"							0.0	
CL: silty clay w/ trace sand, dry, no odor (2.5 YR 3/3)	CL	3'	0.7	60%				
			1.4					
SP: fine sand w/ trace to medium gravel	SW		1.7				5.0	
			1.4	70%	✱	GP-C-08 (6')		
		10'	1.2					
SP: fine sand w/ trace gravel, dry, slight odor (2.5Y 4/4) at 10'	Sandy Gravel	13'	0.7	70%			10.0	
SW: 13' fine sand w/ trace gravel, no odor, dry.	Gravel		2.0					
			1.3	70%			15.0	
		18'	0.8					
orange color at 18'			0.4	80%				

	SW	20'					
wet at 20'						GP-C-08 (20')	20.0
			0.8				
				20%			
End of Boring						GP-C-08 (24')	
							25.0
							30.0

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-C-09

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway
DRILLER:
BORING LOCATION:
FIELD GEOLOGIST: Leena Lothe & Gabriel Herbert
NOTES: SS:GP-C-09 (8')(18')(28')

DATE BEGAN: 8/1/2008
DATE FINISHED: 8/1/2008
DRILLING METHOD:
DRILL EQUIP:
GW DEPTH (OBSERVED): 20'
DEPTH OF BORING: 28'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Readings	Rec. %	Sample Location	Sample ID	Depth (feet)	Notes
Grass: topsoil 2"							0.0	
CL: clay w/ trace to some sand, no odorm dry, (7.5YR 4/3).	CL	3'	1.2					
			1.4					
SW: fine to medium sand w/ trace gravel, dry, no odor (10YR 6/4)	SW	10'	1.9				5.0	
			2.0					
			1.8			GP-C-09 (8')		
SP: fine to medium sand w/ trace gravel, dry, no odor (10YR 6/4)	SP		2.1				10.0	
gravel with pebbles at 13'		13'	2.0					
			2.5				15.0	
		18'	2.4					
wet at 18'			1.9			GP-C-09 (18')		

Description	USCS	Contact	PID		Sample	Sample ID	Depth	Remarks
							20.0	▼
			1.8					
		23'						
soft gray clay at 23', wet, no odor (2.5 Y 4/1) CL: soft gray clay at 23', wet, no odor (2.5 Y 4/1).			1.5					
			1.8				25.0	
SW: medium sand w/ trace silt, no odor, wet	SW		1.4					
End of Boring						GP-C-09 (28')		
							30.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

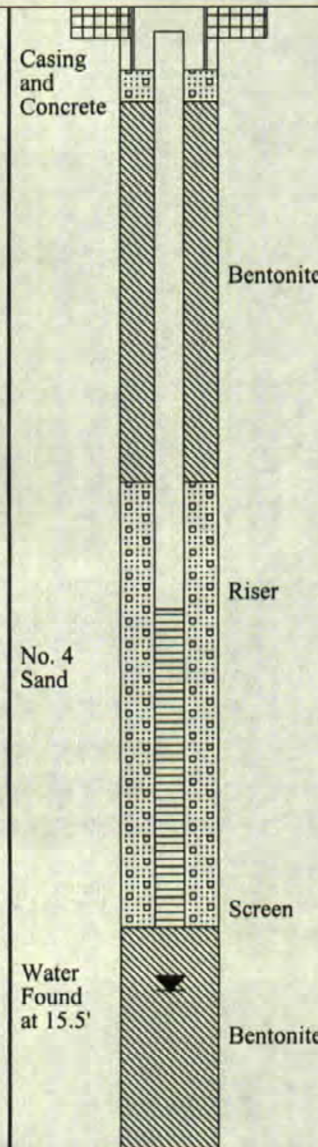
BORING NO: MGW-1

CLIENT: Michigan Meadows
PROJECT LOCATION: Michigan Meadows
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: ATC
DRILLER: Rondel Lattea
BORING LOCATION: East of Bldg 3 on the East Side of the Site
FIELD GEOLOGIST: Jason Lougheed
NOTES:

DATE BEGAN: 4/18/03
DATE FINISHED: 4/18/03
DRILLING METHOD: Direct Push
DRILL EQUIP: 6600 Geoprobe
GW DEPTH (OBSERVED): NA
DEPTH OF BORING: 18.0'
TOP OF CASING ELEVATION:
SURFACE ELEVATION:
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)
TOPSOIL: Topsoil, 10 Y 3/3 dark brown, trace grass roots, trace silt, dry, no odors		0.5	0.8				0.0
CL: SILTY CLAY (CL), 10 YR 3/1 dark grayish brown, slight trace gravel, trace silt			0.1				
- soil color change to 10 YR 3/2 very dark grayish brown beyond 2.5'			0.2	95			
			0.4				
	CL		1.1				
- soil content changes to soft and silty beyond 5.0'			0.6				5.0
			1.0				
		8.0	0.2	80			
SP: FINE TO MEDIUM SAND (SP), 2.5Y 5/2 grayish brown, gravel, trace silt, dry, no odors			0.2				
			0.2				
			0.1				10.0
			0.4				
	SP		0.1	80			
- soil content changes to trace gravel beyond 13.0'			0.1				
			2.3				
- soil is wet at 15.5'		16.0	0.1			Water Sample MGW-1 Taken	15.0
SW: FINE TO MEDIUM SAND (SW), 2.5Y 5/2 grayish brown, gravel, trace silt, wet, no odors	SW		0.4				
		18.0	0.4	50			
- End of boring 18.0'							20.0

Water Level Information



MUNDELL & ASSOCIATES, INC.

BORING LOG

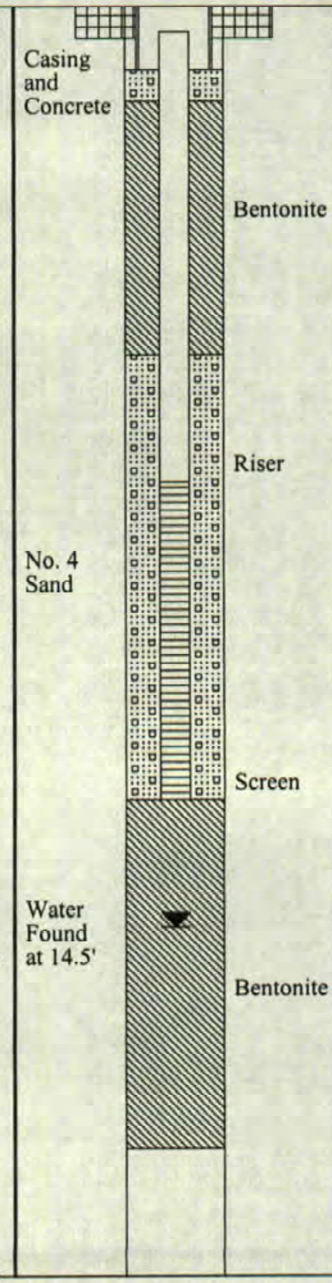
BORING NO: MGW-2

CLIENT: Michigan Meadows
PROJECT LOCATION: Michigan Meadows
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: ATC
DRILLER: Rondel Lattea
BORING LOCATION: Center of BLDG 8, 9, 10, 11 Courtyard, Center of Site
FIELD GEOLOGIST: Jason Lougheed
NOTES:

DATE BEGAN: 4/17/03
DATE FINISHED: 4/17/03
DRILLING METHOD: Direct Push
DRILL EQUIP: 6600 Geoprobe
GW DEPTH (OBSERVED): NA
DEPTH OF BORING: 18.0'
TOP OF CASING ELEVATION:
SURFACE ELEVATION:
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)
TOPSOIL: Topsoil, 10 Y 3/2 very dark grayish brown, trace grass roots, trace silt, dry, no odors		0.5	0.3				0.0
CL: SILTY CLAY (CL), 5 Y 3/2 very dark grayish brown, trace sand, trace gravel, trace silt, trace rocks, dry, no odors	CL	5.0	0.4 0.4 0.3 0.9	65			
SP: FINE TO MEDIUM SAND (SP), 5 YR 5/6 yellowish brown, trace silt, dry, no odors - rock at 7.0' - soil color changes to 2.5 Y 5/3 light olive brown beyond 7.5'	SP	12.5	0.2 0.1 0.1 0.1 0.1 0.1 0.1	50			5.0 10.0
CL: SANDY CLAY (CL), 5 YR 5/6 yellowish brown, sandy, trace silt, moist, no odors - soil color changes to 10YR 5/1 gray and is silty and sandy beyond 14.0' - soil is wet at 14.5'	CL	17.0	0.2 0.4 0.2 0.1 0.1	85 90		Water Sample MGW-2 Taken	15.0
SW: FINE TO MEDIUM SAND (SW) 2.5 Y 4/2 olive gray, trace silt, wet, no odors	SW	18.0	0.4				
- End of boring 18.0'							20.0

Water Level Information



MUNDELL & ASSOCIATES, INC.

BORING LOG

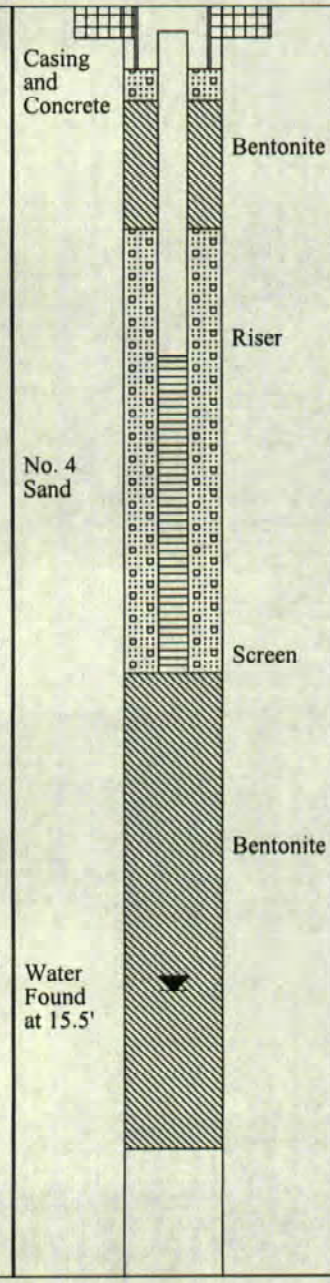
BORING NO: MGW-3

CLIENT: Michigan Meadows
PROJECT LOCATION: Michigan Meadows
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: ATC
DRILLER: Rondel Lattea
BORING LOCATION: East of BLDG 19, SW BLGD 17, NW Portion of the Site
FIELD GEOLOGIST: Jason Lougheed
NOTES:

DATE BEGAN: 4/17/03
DATE FINISHED: 4/17/03
DRILLING METHOD: Direct Push
DRILL EQUIP: 6600 Geoprobe
GW DEPTH (OBSERVED): NA
DEPTH OF BORING: 18.0'
TOP OF CASING ELEVATION:
SURFACE ELEVATION:
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)
TOPSOIL: Topsoil, 10 Y 2/2 very dark black, trace grass roots, trace silt, dry, no odors		0.5	0.1				0.0
CL: SANDY CLAY (CL), 10 YR 2/2 very dark black, trace roots, trace silt, gravel, dry, no odors			0.1				
- soil contents changes to trace gravel beyond 2.5'			0.1	65			
	CL		0.1				
			0.2				
			0.1				5.0
		7.0	0.1				
SP: FINE TO MEDIUM SAND (SP), 7 Y 4/2 dark greyish brown, trace silt, dry, no odors			0.1	65			
	SP		0.3				
		10.0	0.2				
CL: SILTY CLAY (CL), 5 YR 5/1 grey, trace silt, dry, no odors			0.1				10.0
			0.1				
	CL		0.1	60			
			0.1				
		14.5	0.1				
SP: FINE TO MEDIUM SAND (SP) 10 YR 5/4 yellowish brown, trace silt, dry, no odors	SP	15.0				Water Sample MGW-3 Taken	15.0
- End of boring 15.0'							
- soil is wet at 15.5'							20.0

Water Level Information



MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MGW-4

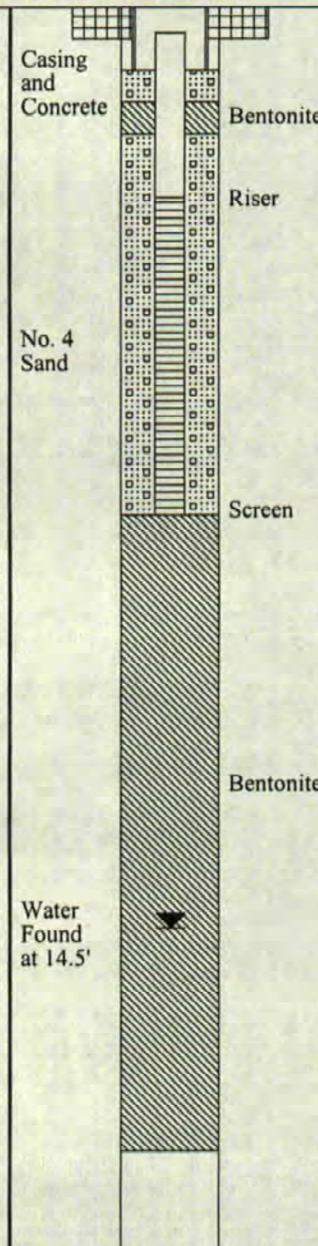
CLIENT: Michigan Meadows
PROJECT LOCATION: Michigan Meadows
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: ATC
DRILLER: Rondel Lattea
BORING LOCATION: Center of BLDG 22, 23, 13, 14 Courtyard, SW Portion of Site
FIELD GEOLOGIST: Jason Lougheed
NOTES:

DATE BEGAN: 4/17/03
DATE FINISHED: 4/17/03
DRILLING METHOD: Direct Push
DRILL EQUIP: 6600 Geoprobe
GW DEPTH (OBSERVED): NA
DEPTH OF BORING: 18.0'
TOP OF CASING ELEVATION:
SURFACE ELEVATION:
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)
TOPSOIL: Topsoil, 10 Y 3/3 dark brown, trace grass roots, trace silt, dry, no odors		
CL: SILTY CLAY, 5 Y 4/2 olive gray, trace gravel, trace silt, dry, no odors	CL	2.5
SP: FINE TO MEDIUM SAND SP), 5 Y 5/2 olive gray, trace gravel, trace fine and coarse gravel, trace silt, dry, no odors - soil color changes to 10 YR 4/4 dark yellowish brown beyond 7.0'	SP	8.0
CL: SILTY CLAY (CL), 10 YR 4/4 dark yellowish brown, trace gravel, dry, no odors - soil color change to 5Y 5/2 olive gray, moist beyond 8.5' - soil color change to 5Y 5/1 gray, moist beyond 10.0'	CL	14.0
SP: FINE TO MEDIUM SAND (SP) 10YR 6/4 light yellow brown, trace silt, moist, no odors - soil is wet, color change to 5Y 5/1 gray, silty, trace gravel beyond 14.5' - soil color change 10 YR 5/3 brown beyond 17.0'	SP	18.0
- End of boring 18.0'		

Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID
0.0–1.0	0.1	60		
1.0–2.0	0.1			
2.0–3.0	0.1			
3.0–4.0	0.1			
4.0–5.0	0.1			
5.0–6.0	0.1	90		
6.0–7.0	0.1			
7.0–8.0	0.1			
8.0–9.0	0.1			
9.0–10.0	0.1			
10.0–11.0	0.1	90		
11.0–12.0	0.1			
12.0–13.0	0.1			
13.0–14.0	0.1			
14.0–15.0	0.1		✱	Water Sample MGW-4 Taken
15.0–16.0	0.4	90		
16.0–17.0	0.1			
17.0–18.0	0.1			

Water Level Information



MUNDELL & ASSOCIATES, INC.

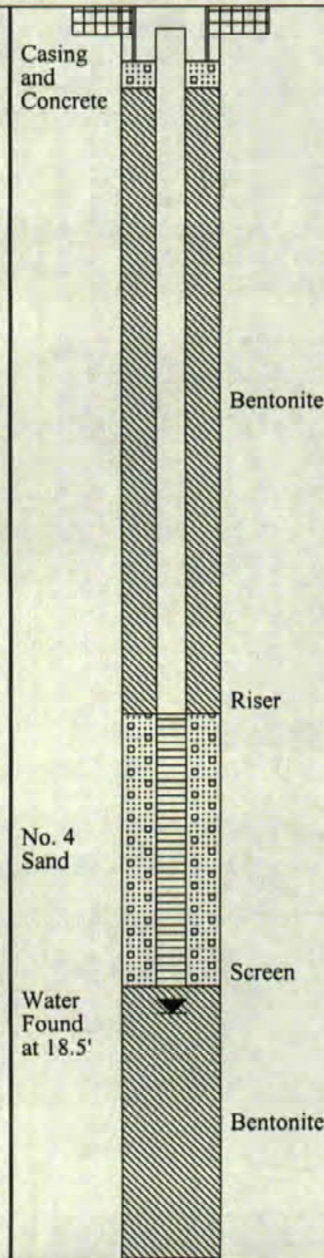
BORING LOG **BORING NO:** MGW-5

CLIENT: Michigan Meadows
PROJECT LOCATION: Michigan Meadows
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: ATC
DRILLER: Rondel Lattea
BORING LOCATION: East of Michigan Plaza in Parking Lot, South End of Site
FIELD GEOLOGIST: Jason Lougheed
NOTES:

DATE BEGAN: 4/18/03
DATE FINISHED: 4/18/03
DRILLING METHOD: Direct Push
DRILL EQUIP: 6600 Geoprobe
GW DEPTH (OBSERVED): NA
DEPTH OF BORING: 23.0'
TOP OF CASING ELEVATION:
SURFACE ELEVATION:
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)
ASPHALT: Asphalt, 5 Y 2.5/2 black, dry, no odors		0.5	3.0				0.0
FILL GRAVEL AND SAND: SUBBASE, 5 Y 2.5/2 black, trace sand, medium silt, dry, no odors		1.5	0.8				
FILL: FILL SILTY CLAY, 5 Y 2.5/2 black,trace ash, trace silt, dry, no odors		2.5	0.7	65			
CL: SILTY CLAY (CL), 2.5 Y 3/2 very dark greyish brown, trace silt, trace gravel, no ash, dry, no odors beyond 2.5'	CL		0.3				
		5.0	0.1				
SP: FINE TO MEDIUM POORLY GRADED SAND (SP) 5 Y 5/3 olive, trace silt, trace gravel, dry, no odors			0.1				5.0
			0.2				
			3.0	80			
- soil content changes fine to medium sand beyond 8.0'			1.5				
			0.8				
			0.1				10.0
			0.1				
- soil contains medium silt and trace gravel beyond 12.0'	SP		0.3	80			
- rock at 12.5'			0.2				
			0.2				
			0.2				15.0
			0.3				
- soil color changes to 2.5 Y 5/2 grayish brown beyond 17.0'			0.3	85			
- trace silty clay at 18.0' - soil is wet at 18.5'			0.4			Water Sample MGW-5 Taken	
- color change to 10 YR 5/6 yellowish brown from 19.0 to 19.5'		20.0	0.5				
SW: FINE TO MEDIUM SAND (SW) 2.5 Y 5/2 grayish brown, trace silt, wet, no odors			0.4				20.0
	SW		0.2	80			
		23.0	0.1				
- End of boring 23.0'							
							25.0

Water Level Information



MUNDELL & ASSOCIATES, INC.

BORING LOG

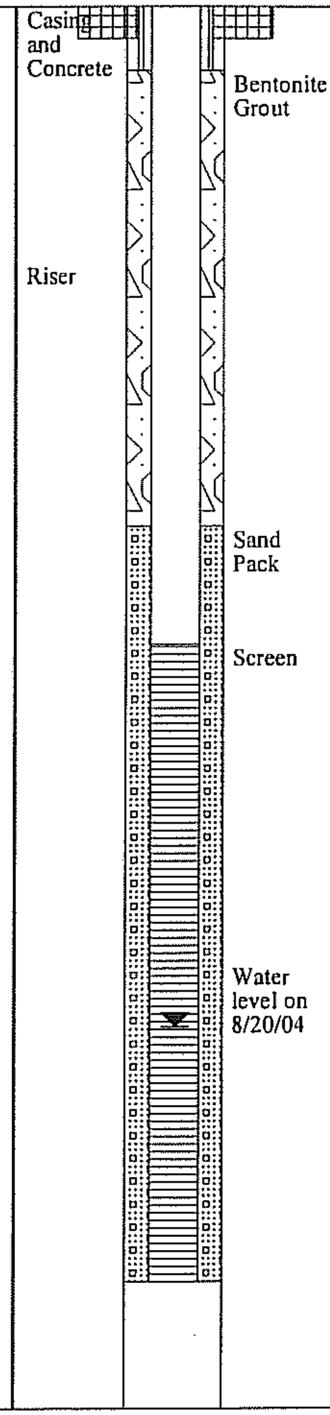
BORING NO: MMW-1S

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Bernie Byers
BORING LOCATION: Grassy Area SW Corner of Bldg 1
FIELD GEOLOGIST: Leena Lothe & Jason Armour
NOTES: Soil sample MMW-1S collected at 14.5'

DATE BEGAN: 08/20/04
DATE FINISHED: 08/20/04
DRILLING METHOD: HSA with 4' Geoprobe Sampler
DRILL EQUIP: CME 70
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 20'
TOP OF CASING ELEVATION: 713.66'
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)
TOPSOIL: About a foot of topsoil			3.3				0.0
FILL: FILL silty clay with trace sand and trace to some gravel, light brown (7.5 YR 6/3) fill material with roots noted, coal/slag fragment noted at 3 feet, dark brown (7.5 YR 3/2) slight moist, no odor		1	3.2				
			3.4	100%			
CL: SILTY CLAY with some fine to medium sand, very dusky red (10 R 2.5/2), dry, no odor		3	3.6				
			4.4				
	CL		5.2				5.0
			5.3	65%			
			4.9				
			NA				
			NA				
			5.0	40%			10.0
SW: FINE TO MEDIUM SAND with some coarse sand, trace to some fine to medium gravel, trace silt, light gray (2.5 Y 7/2), powdery texture, dry, no odor		11	4.6				
			NA				
			9.3				
	SW		10.9	70%			
- very moist at 15.5', and wet at 16'			8.1				15.0
- 2' split spoon samples			NA				
			NA	0%			
SM: SILTY SAND, sand silt mixture, dark gray (2.5 Y 4/1), slightly wet, no odor		18	4.0				
- End of Boring at 20'	SM		3.5	100%			20.0

Water Level Information



MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-2S

PAGE 1 OF 1

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Bernie Byers
BORING LOCATION: Center of Property, by building 7
FIELD GEOLOGIST: Leena Lothe & Jason Armour
NOTES: Soil sample MMW-2S collected at 13.0'

DATE BEGAN: 08/20/04
DATE FINISHED: 08/20/04
DRILLING METHOD: HSA with 4' Geoprobe Sampler
DRILL EQUIP: CME 70
GW DEPTH (OBSERVED): 15'
DEPTH OF BORING: 20'
TOP OF CASING ELEVATION: 713.43'
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
TOPSOIL: About a foot of topsoil			3.1				0.0	Casing and Concrete
FILL: Potential FILL, silty clay with trace to some sand, dark yellowish brown (10 YR 3/6) dry, no odor		1	2.8					Bentonite Grout
			2.4	75%				
CL: SILTY CLAY with trace to some sand and fine to medium gravel, very dark brown (10 YR 2/2), dry, no odor	CL	3	3.0					
			2.8					Riser
			2.9				5.0	
- Mottled sand observed at about 7 feet, red (2.5 YR 4/6)			3.0	85%				
			2.6					
			2.8					Sand Pack
			2.7					
SW/SM: FINE TO COARSE SAND with trace fine gravel, some silt, possibly grading to SM at about 15', very dark brown (10 YR 2/2), dry, no odor	SW/SM	10	3.0	80%			10.0	Screen
			2.5					
			NA					
- Trace medium gravel observed beyond 11.75 feet			16		✱			
			1.9	75%				
SM: SILTY SAND fine to medium sand with fine gravel, sand silt mixture, very dark brown (10 YR 2/2), wet, no odor	SM		2.1				15.0	Water level on 8/20/04
			NA					
ML: CLAYEY SILT exhibiting dilatancy, with trace fine sand and fine gravel, gray (2.5 Y 5/1), wet, no odor	ML	17	1.6					
			1.9	70%				
			2.1					
GM: Fine to medium SANDY GRAVEL with some silt, slightly wet, no odor	GM	19.5					20.0	
- End of Boring at 20'								

MUNDELL & ASSOCIATES, INC.
BORING LOG

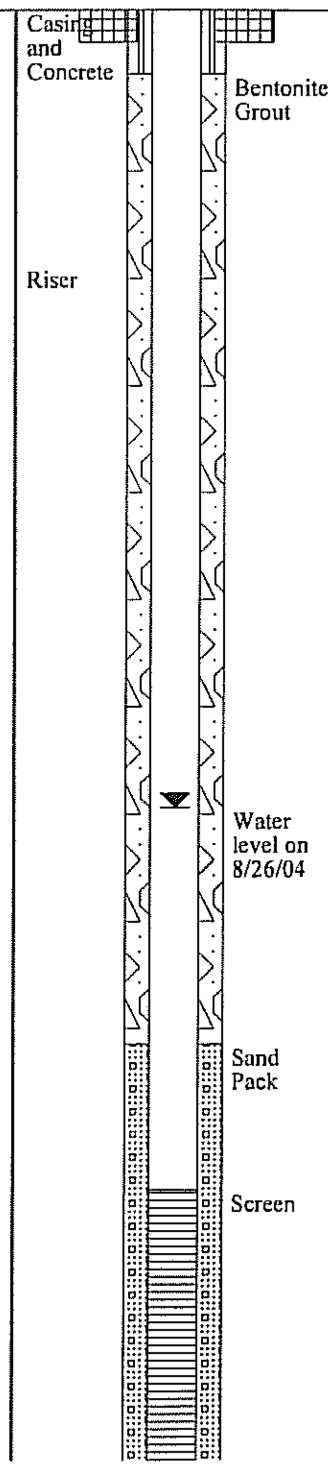
BORING NO: MMW-3S

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Bernie Byers
BORING LOCATION: North east corner of the playground
FIELD GEOLOGIST: Leena Lothe
NOTES: Soil sample MMW-3S collected at 10.0'

DATE BEGAN: 08/26/04
DATE FINISHED: 08/26/04
DRILLING METHOD: HSA with 4' Geoprobe Sampler
DRILL EQUIP: ATV
GW DEPTH (OBSERVED): 12.5 '
DEPTH OF BORING: 30'
TOP OF CASING ELEVATION: 711.58
SURFACE ELEVATION: N/A
COMMENTS: split spoon after 13'

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)
TOPSOIL: About a foot of topsoil with grass, potential fill material			6.2	80%			0.0
CL: SILTY CLAY with trace sand, dark yellowish brown (10 YR 4/4), dry, no odor	CL	1	6.4				
SP: FINE TO MEDIUM SAND, very dark brown (10 YR 2/2), dry, no odor	SP	2	8.0				
			5.1				
			5.6	90%			
			5.2				5.0
SW: FINE TO MEDIUM SAND with trace to some gravel, very dark brown (10 YR 2/2), dry, no odor	SW	5.5	7.1				
			5.9				
- slight reddish yellow discoloration (5 YR 6/8) noted at about 6 feet			7.0	75%			
SM: SILTY CLAYEY SAND mixture, very dark brown (10 YR 2/2), dry, no odor	SM	9.0	8.0		✱		
SW: FINE TO MEDIUM SAND with trace to some gravel, very dark brown (10 YR 3/2), wet, no odor	SW	10.0	6.4				10.0
			7.3				
			6.7				
CL: SILTY CLAY with trace to some sand, wet, no odor	CL	13.0	4.8	80%			
SW: FINE TO MEDIUM SAND with trace to some silt, and trace to some gravel, wet, no odor	SW	14.0	5.2				
							15.0
SM: SILTY CLAYEY SAND mixture, wet, no odor	SM	18.0	6.5	75%			
SW: FINE TO MEDIUM SAND with trace to some silt, and trace to some gravel, wet, no odor	SW	18.5	5.9				
		20.0					20.0

Water Level Information



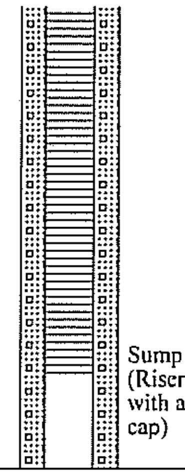
MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-3S

CLIENT: AIMCO	**DATE BEGAN:** 08/26/04
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED:** 08/26/04
PROJECT NAME: Michigan Meadows	**DRILLING METHOD:** HSA with 4' Geoprobe Sampler
PROJECT NO: M01046	**DRILL EQUIP:** ATV
DRILLING CONTRACTOR: American Drilling Services	**GW DEPTH (OBSERVED):** 12.5 '
DRILLER: Bernie Byers	**DEPTH OF BORING:** 30'
BORING LOCATION: North east corner of the playground	**TOP OF CASING ELEVATION:** 711.58
FIELD GEOLOGIST: Leena Lothe	**SURFACE ELEVATION:** N/A
NOTES: Soil sample MMW-3S collected at 10.0'	**COMMENTS:** split spoon after 13'

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
SW: FINE TO MEDIUM SAND with trace to some silt, and trace to some gravel, wet, no odor	SW	23.0	8.0 6.7	60%				
		25.0					25.0	
SM: SILTY SANDY CLAYEY mixture	SM	28.0	6.2					
CL: SILTY CLAY (soft), wet, no odor - End of the Boring at 30'	CL	29.0		50%			30.0	



MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-4D

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Bernie Byers
BORING LOCATION: Grass Area NW of basketball pole
FIELD GEOLOGIST: Leena Lothe
NOTES: Soil sample MMW-4D collected at 9 - 10'

DATE BEGAN: 08/25/04
DATE FINISHED: 08/25/04
DRILLING METHOD: HSA with 4' Geoprobe Sampler
DRILL EQUIP: CME 70
GW DEPTH (OBSERVED): 11.5 '
DEPTH OF BORING: 66'
TOP OF CASING ELEVATION: 711.64
SURFACE ELEVATION: N/A
COMMENTS: Sand heaving, drillers washing split spoon, spl.

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
TOPSOIL: About a foot of topsoil with grass, potential fill material - fine to medium sand with trace gravel	TOPSOIL		0.9				0.0	Casing and Concrete
SW: FINE TO MEDIUM SAND with trace to some gravel, brown (10 YR 4/3), dry, no odor		1	0.8					Bentonite Grout
- black (2.5 Y 2/2) coloration at approximately 3'		2	1.4	60%				
			6.8					
	SW		6.7					Riser
			7.3				5.0	
		5.5	6.0	60%				
- intermittant red coloration observed (2.5 YR 4/8) at 7'			6.1					
			NA					
- gray (2.5 YR 5/0) coloration observed at 9'		9.0	7.2		✱			
		10.0	7.1	60%			10.0	
SM: SILTY CLAYEY SAND, brown (10 YR 4/3), dry, no odor	SM		6.1					
SW: FINE TO MEDIUM SAND with trace to some fine to medium gravel, clayey sand, strong brown (7.5 YR 5/6), dry, no odor	SW		5.8					Water level on 8/25/04
SM: SILTY CLAYEY SAND mixture, slight dilationary property observed, gray (10 YR 5/1), dry, no odor	SM	13.0	4.2					
CL: SILTY CLAY with trace to some sand, wet, no odor	CL	14.0	6.6	70%				
SW: FINE TO MEDIUM SAND with trace to some silt, wet, no odor	SW		5.8				15.0	
SP: FINE TO MEDIUM SAND - silty-clayey sand, trace to some gravel, wet, no odor	SP							
		18.0						
		18.5						
			3.6					
		20.0	4.6	80%			20.0	

MUNDELL & ASSOCIATES, INC.
BORING LOG

BORING NO: MMW-4D

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Bernie Byers
BORING LOCATION: Grass Area NW of basketball pole
FIELD GEOLOGIST: Leena Lothe
NOTES: Soil sample MMW-4D collected at 9 - 10'

DATE BEGAN: 08/25/04
DATE FINISHED: 08/25/04
DRILLING METHOD: HSA with 4' Geoprobe Sampler
DRILL EQUIP: CME 70
GW DEPTH (OBSERVED): 11.5 '
DEPTH OF BORING: 66'
TOP OF CASING ELEVATION: 711.64
SURFACE ELEVATION: N/A
COMMENTS: Sand heaving, drillers washing split spoon, spl. s

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
		23.0						
			4.7					
SW: FINE TO MEDIUM SAND with trace to some fine to medium gravel, moist, no odor		25.0	6.4	100%			25.0	
								Riser
	SW	28.0						
		29.0	8.0					
		30.0	8.1	90%			30.0	
GM: SANDY GRAVELS, GRAVEL-SAND-SILT mixtures, wet, no odor	GM							
SW: FINE TO MEDIUM SAND with trace to some silt, and trace to some gravel, wet, no odor	SW		7.5					
SM: SILTY SANDY CLAYEY mixture			7.4	85%			35.0	
- stone chips & pebbles noted at 35.5'	SM							
SW: FINE TO MEDIUM SAND with some clay (soft), wet, no odor			6.0					
			9.2	65%			40.0	
	SW							
- cobble chips layer observed at 40', 45', and at 50' (3-4 inches of cobble at 50')								
			8.4					
				55%			45.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG **BORING NO:** MMW-4D

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Bernie Byers
BORING LOCATION: Grass Area NW of basketball pole
FIELD GEOLOGIST: Leena Lothe
NOTES: Soil sample MMW-4D collected at 9 - 10'

DATE BEGAN: 08/25/04
DATE FINISHED: 08/25/04
DRILLING METHOD: HSA with 4' Geoprobe Sampler
DRILL EQUIP: CME 70
GW DEPTH (OBSERVED): 11.5 '
DEPTH OF BORING: 66'
TOP OF CASING ELEVATION: 711.64
SURFACE ELEVATION: N/A
COMMENTS: Sand heaving, drillers washing split spoon, spl. s

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
			38					Sand Pack
								Screen
			12.3	55%				
			10.2				50.0	
			7.0	75%				
			10.1				55.0	
			6.1	90%				
			11.0				60.0	
CL: HARD COMPACT CLAY, with trace to some sand, moist, no odor	CL							Sump (Riser with a cap)
			3.5	60%				
			4.9				65.0	
- End of the Boring at 66'								

MUNDELL & ASSOCIATES, INC.
BORING LOG

BORING NO: MMW-5D

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Bernie Byers
BORING LOCATION: Central area of the northern fenceline
FIELD GEOLOGIST: Leena Lothe
NOTES: Soil sample MMW-5D collected at 11'

DATE BEGAN: 08/24/04
DATE FINISHED: 08/24/04
DRILLING METHOD: HSA with 4' Geoprobe Sampler
DRILL EQUIP: CME 70
GW DEPTH (OBSERVED): 12.0 '
DEPTH OF BORING: 51'
TOP OF CASING ELEVATION: 711.75
SURFACE ELEVATION: N/A
COMMENTS: Sand heaving, split spoon after 19'

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
TOPSOIL: About a foot of topsoil, top two inches asphalt	TOPSOIL		NA				0.0	Casing and Concrete
SP: FINE TO MEDIUM SAND with trace gravel, dark yellowish brown (10YR 4/6), intermittant gray (10 YR 5/1) and red (10R 4/6) coloration, dry, no odor	SP	1	2.6					Bentonite Grout
SW: FINE TO MEDIUM SAND with trace to some gravel, dry, no odor	SW	2	4.3	70%				
			3.6					Riser
			NA				5.0	
			4.0					
			5.8	70%				
			7.2					
			6.0					
			6.1					
SM: SILTY CLAYEY SAND mixture, with trace to some gravel, dry, no odor	SM	9.5	7.2	80%			10.0	
SW: FINE TO MEDIUM SAND with medium to large coarse gravel (10-12'), moist, no odor	SW	10.5	4.0		✱			
			NA					Water level on 8/24/04
			4.4					
			5.4	75%				
SP: FINE TO MEDIUM SAND with trace to some gravel, wet, no odor	SP	15.0	7.2				15.0	
SW: FINE TO MEDIUM SAND with trace to some gravel, wet, no odor	SW	19.0	7.8					
			13.1	60%			20.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-5D

CLIENT: AIMCO	**DATE BEGAN:** 08/24/04
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED:** 08/24/04
PROJECT NAME: Michigan Meadows	**DRILLING METHOD:** HSA with 4' Geoprobe Sampler
PROJECT NO: M01046	**DRILL EQUIP:** CME 70
DRILLING CONTRACTOR: American Drilling Services	**GW DEPTH (OBSERVED):** 12.0 '
DRILLER: Bernie Byers	**DEPTH OF BORING:** 51'
BORING LOCATION: Central area of the northern fenceline	**TOP OF CASING ELEVATION:** 711.75
FIELD GEOLOGIST: Leena Lothe	**SURFACE ELEVATION:** N/A
NOTES: Soil sample MMW-5D collected at 11'	**COMMENTS:** Sand heaving, split spoon after 19'

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
SW: FINE TO MEDIUM SAND with trace to some gravel, wet, no odor	SW		10.6 12.4	70%			25.0	Riser
SW: FINE TO MEDIUM SAND with trace to some gravel, wet, no odor - coarse gravel & gravel chips noted at 30.5'	SW		13.7 15.6	90%			30.0	
SW: FINE TO MEDIUM SAND with trace to some gravel, trace silt, wet, no odor	SW		4.5 5.3	60%			35.0	Sand Pack Screen
SW: FINE TO MEDIUM SAND with trace to some gravel, wet, no odor	SW		29.3 23.7	90%			40.0	
SW: FINE TO MEDIUM SAND with trace to some gravel, trace silt, wet, no odor			35	100%			45.0	

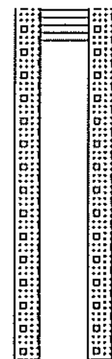
MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-5D

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Bernie Byers
BORING LOCATION: Central area of the northern fenceline
FIELD GEOLOGIST: Leena Lothe
NOTES: Soil sample MMW-5D collected at 11'

DATE BEGAN: 08/24/04
DATE FINISHED: 08/24/04
DRILLING METHOD: HSA with 4' Geoprobe Sampler
DRILL EQUIP: CME 70
GW DEPTH (OBSERVED): 12.0 '
DEPTH OF BORING: 51'
TOP OF CASING ELEVATION: 711.75
SURFACE ELEVATION: N/A
COMMENTS: Sand heaving, split spoon after 19'

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
CL: COMPACT CLAY, with trace to some sand, moist, no odor	CL	45.5	14.8					
			NA	50%			50.0	
- noted a thin sand seam at 50.25'			12.2					
- End of the Boring at 51'							55.0	

MUNDELL & ASSOCIATES, INC.

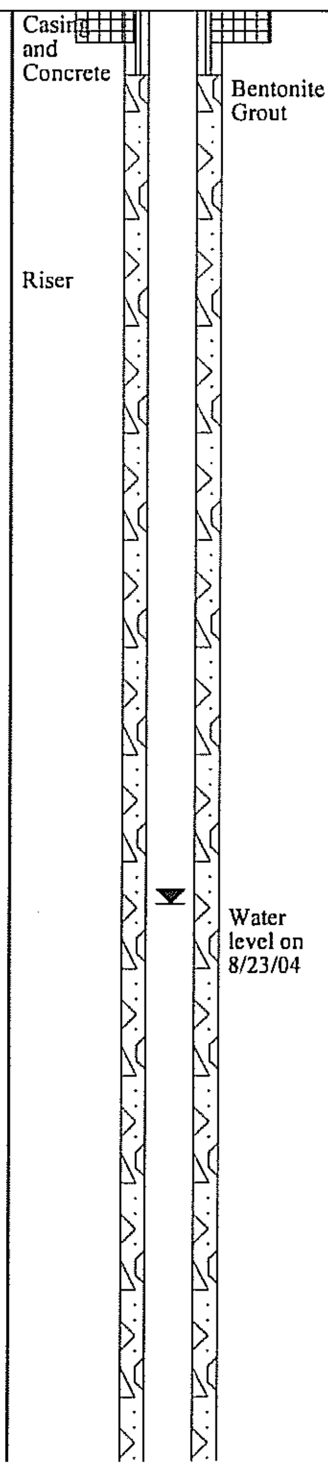
BORING LOG

BORING NO: MMW-6D

CLIENT: AIMCO	**DATE BEGAN:** 08/23/04 — PAGE 1 OF 3
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED:** 08/23/04
PROJECT NAME: Michigan Meadows	**DRILLING METHOD:** HSA with 4' Geoprobe Sampler
PROJECT NO: M01046	**DRILL EQUIP:** CME 70
DRILLING CONTRACTOR: American Drilling Services	**GW DEPTH (OBSERVED):** 14.0 '
DRILLER: Bernie Byers	**DEPTH OF BORING:** 51'
BORING LOCATION: NW area along northern fenceline	**TOP OF CASING ELEVATION:** 712.68
FIELD GEOLOGIST: Leena Lothe	**SURFACE ELEVATION:** N/A
NOTES: Soil sample MMW-6D collected at 11-12'	**COMMENTS:** split spoon after 24'

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)
TOPSOIL: Top two inches asphalt followed by 4 inches base gravel	TOPSOIL		NA	75%			0.0
SW: FINE TO MEDIUM SAND with trace to some fine to medium gravel, reddish brown (5 YR 4/3), dry, no odor	SW	1	0.7				
			1.4				
- yellow (2.5 Y 7/6) coloration noted at 3.5', roots noted.			2.3				
			2.4	80%			
			4.9				5.0
			2.3				
			2.5				
SP: FINE TO MEDIUM SAND with trace to some gravel, red (10 R 4/8) coloration noted at approx. 8', dry, no odor	SP	7.5					
SW: FINE TO MEDIUM SAND with trace to some gravel, light yellowish brown (2.5Y 6/3) moist, no odor	SW	8.0	1.7	75%			
			2.7				
			3.6				10.0
			4.9		✱	MMW-6D	
CL: SANDY SILTY CLAY with trace to some mottled sand, red coloration (10R 4/8), moist, no odor	CL	11.5	3.1	70%			
			5.6				
			7.3				
			7.7				15.0
			5.6	75%			
			5.8				
			8.1				
			6.1				20.0
			NA	65%			
SP: FINE CLAYEY SILTY SAND, with trace to some gravel, gray (2YR 5/0), wet, no odor	SP	21.0 / 21.5	3.5				
SW: FINE TO MEDIUM SAND with trace to some gravel, wet, no odor	SW	22.0	7.2				

Water Level Information



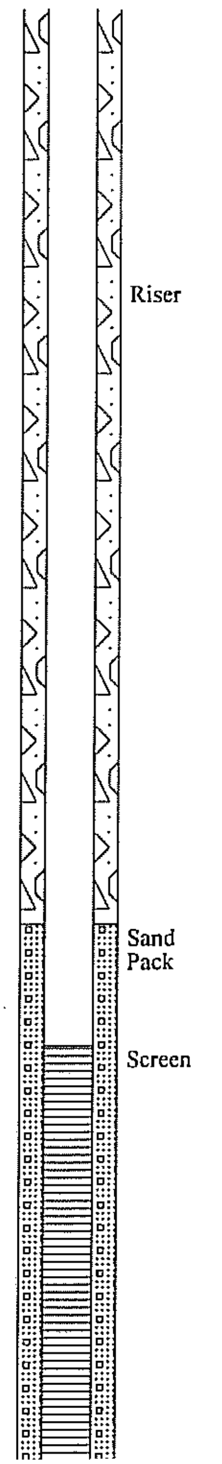
MUNDELL & ASSOCIATES, INC.

BORING LOG **BORING NO:** MMW-6D

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Bernie Byers
BORING LOCATION: NW area along northern fenceline
FIELD GEOLOGIST: Leena Lothe
NOTES: Soil sample MMW-6D collected at 11-12'

DATE BEGAN: 08/23/04
DATE FINISHED: 08/23/04
DRILLING METHOD: HSA with 4' Geoprobe Sampler
DRILL EQUIP: CME 70
GW DEPTH (OBSERVED): 14.0 '
DEPTH OF BORING: 51'
TOP OF CASING ELEVATION: 712.68
SURFACE ELEVATION: N/A
COMMENTS: split spoon after 24'

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
SP: FINE SILTY SAND, with trace to some gravel, wet, no odor		23.0	9.8					
		24.0	5.3					
	SP		6.2	70%			25.0	
			10.2					
			4.1	50%				
			9.6					
			10.8	50%				
SW: FINE TO MEDIUM SAND with trace to some siltl, wet, no odor		30.0	5.2				30.0	
	SW	31.5	7.7	60%				
							35.0	
SP: FINE TO MEDIUM SAND with trace to some gravel, trace silt, wet, no odor	SP	37.25	14.7					
SW: FINE TO MEDIUM SAND with trace to some gravel, wet, no odor		37.5	25.1	80%				
	SW						40.0	
			17.4					
				60%			45.0	



MUNDELL & ASSOCIATES, INC.
BORING LOG

BORING NO: MMW-6D

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Bernie Byers
BORING LOCATION: NW area along northern fenceline
FIELD GEOLOGIST: Leena Lothe
NOTES: Soil sample MMW-6D collected at 11-12'

DATE BEGAN: 08/23/04
DATE FINISHED: 08/23/04
DRILLING METHOD: HSA with 4' Geoprobe Sampler
DRILL EQUIP: CME 70
GW DEPTH (OBSERVED): 14.0 '
DEPTH OF BORING: 51'
TOP OF CASING ELEVATION: 712.68
SURFACE ELEVATION: N/A
COMMENTS: split spoon after 24'

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
			10.2					
	CL	48	6.9	80%			50.0	
			7.2					
- End of the Boring at 51'								

MUNDELL & ASSOCIATES, INC.

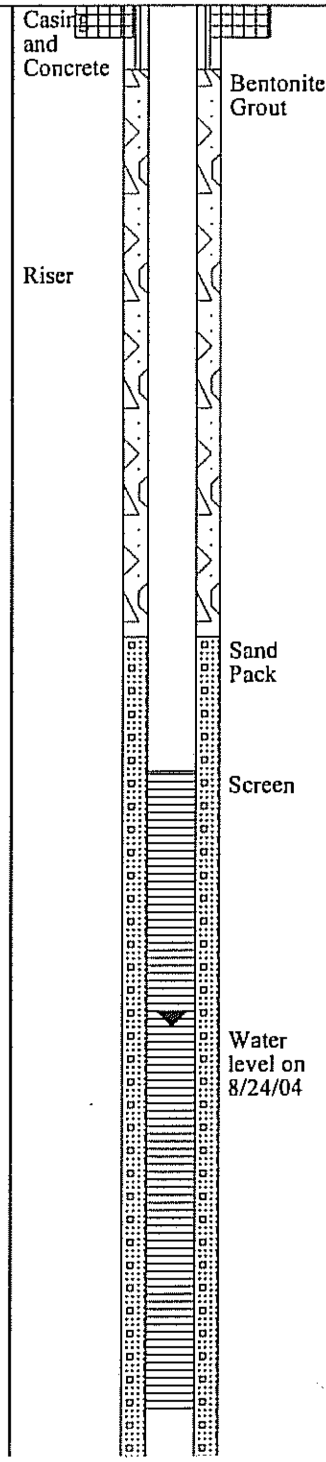
BORING LOG

BORING NO: MMW-7S

CLIENT: AIMCO	**DATE BEGAN:** 08/24/04 PAGE 1 OF 2
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED:** 08/24/04
PROJECT NAME: Michigan Meadows	**DRILLING METHOD:** HSA with 4' Geoprobe Sampler
PROJECT NO: M01046	**DRILL EQUIP:** CME 70
DRILLING CONTRACTOR: American Drilling Services	**GW DEPTH (OBSERVED):** 16.0 '
DRILLER: Bernie Byers	**DEPTH OF BORING:** 26'
BORING LOCATION: NW corner well	**TOP OF CASING ELEVATION:** 712.35
FIELD GEOLOGIST: Leena Lothe	**SURFACE ELEVATION:** N/A
NOTES: Soil sample MMW-7S collected at 15.5-16.5'	**COMMENTS:** split spoon after 24'

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)
ASPHALT: Top three inches asphalt followed by subase	ASPHA		1.2				0.0
SW: FINE TO MEDIUM SAND, potential fill with trace fine to medium gravel, light yellowish brown (2.5 Y 6/4), dry, no odor		1	4.1				
- color change beyond 2.0' to dark yellowish brown (10 YR 3/4)			3.7	90%			
			6.7				
			5.6				
	SW		4.8				5.0
SW: PEBBLES with trace fine sand, gray (10 YR 6/1), dry, no odor			5.9	80%			
		7.5	4.9				
		8.0	5.4				
			7.1				
			8.8	90%			10.0
	SW	11.5	5.4				
			4.9				
			7.1				
			6.8	90%			
SP: FINE TO MEDIUM COARSE SAND, dark grayish brown (10 YR 4/2) moist, no odor			6.7				15.0
			4.2		✱		
	SP		5.5				
			7.3	90%			
			7.4				
							20.0
		21.0					
		21.5					
		22.0					

Water Level Information



MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-7S

CLIENT: AIMCO	**DATE BEGAN:** 08/24/04
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED:** 08/24/04
PROJECT NAME: Michigan Meadows	**DRILLING METHOD:** HSA with 4' Geoprobe Sampler
PROJECT NO: M01046	**DRILL EQUIP:** CME 70
DRILLING CONTRACTOR: American Drilling Services	**GW DEPTH (OBSERVED):** 16.0 '
DRILLER: Bernie Byers	**DEPTH OF BORING:** 26'
BORING LOCATION: NW corner well	**TOP OF CASING ELEVATION:** 712.35
FIELD GEOLOGIST: Leena Lothe	**SURFACE ELEVATION:** N/A
NOTES: Soil sample MMW-7S collected at 15.5-16.5'	**COMMENTS:** split spoon after 24'

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
		23.0						
		24.0	3.7	90%			25.0	
			9.1					
- End of the Boring at 26'								Riser
							30.0	

MUNDELL & ASSOCIATES, INC.
BORING LOG

BORING NO: MMW-8S

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: South of Building 6
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 3 GW samples: MMW-8S (20'), (30'), (40'); SS: 14-15'

DATE BEGAN: 1/11/07
DATE FINISHED: 1/11/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
							0.0	
- blind drilled								
							5.0	
							10.0	
					✱			
							15.0	▼
					✱		20.0	
- Well set at 24'								
							25.0	
					✱		30.0	
							35.0	

MUNDELL & ASSOCIATES, INC.
BORING LOG

BORING NO: MMW-8S

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: South of Building 6
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 3 GW samples: MMW-8S (20'), (30'), (40'); SS: 14-15'

DATE BEGAN: 1/11/07
DATE FINISHED: 1/11/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
- End of Boring at 40'					✷		40.0	

Boring/Well ID: MMW-08S-A

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/5/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/5/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 17.0 ft
BORING LOCATION: 3' NW of MMW-8S	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments
0		Soil	0.5				
1	CL	SILTY CLAY, dark gray (10YR 4/2), slightly moist, stiff, slightly plastic, with some fine granules	3.0		100		H.A. to 4'
3	SC	CLAYEY SAND with some gravel, grayish brown (10 YR 5/2), loose, slightly moist	4.5				TPV not recorded 0 to 20'
4.5	CL	SILTY CLAY, dark gray (10 YR 4/1), stiff, slightly moist, slightly plastic	10.3		47.5		
8					67.5		
10.3	SM	SILTY fine to medium SAND, with some fine granules, brown (10 YR 5/3), moist, loose					
13		Coarse granules below 13.0'			52.5		
16		Minimal silt below 16.0'					
17		Wet below 17.0'			75		
18.6		Gray-black discoloration below 18.6'	21.5				
20				0.45	77.5		
21.5		Fine to coarse GRANULES with SAND, gray (10YR 5/1), wet, loose, granules subrounded to rounded					
22				0.15			

MMW-08S-A

2" Dia. Borehole

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

H.A. = Hand Auger

03-12-2013 T:\2001\M01046 Michigan Meadows Apts\Data\Boring Logs\Miscellaneous Files\MMW-08S-A.bor

Boring/Well ID: MMW-08S-A

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/5/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/5/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 17.0 ft
BORING LOCATION: 3' NW of MMW-8S	SURFACE ELEVATION: NS

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	MMW-08S-A
24									
25					0.05				
26						75			
27					0.0				
28									
29					1.3				
30						62.5			
31					0.0				
32									2" Dia. Borehole
33					0.0				
34						55			
35					0.3				
36									
37					0.25				
38				38.0		70			
39	CL		SILTY CLAY, dark gray (10 YR 4/1), stiff, slightly moist, non-plastic		0.0				
40			End of boring at 40.0'						
41									
42									
43									
44									
45									
46									
47									
48									

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

H.A. = Hand Auger

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-9S

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: South of Building 1
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 3 GW samples: MMW-9S (20'), (30'), (40'); SS: 15-16'

DATE BEGAN: 1/11/07
DATE FINISHED: 1/12/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
							0.0	
- blind drilled								
							5.0	
							10.0	
							15.0	
							20.0	
- Well set at 25'							25.0	
							30.0	
							35.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-9S

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: South of Building 1
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 3 GW samples: MMW-9S (20'), (30'), (40'); SS: 15-16'

DATE BEGAN: 1/11/07
DATE FINISHED: 1/12/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
- End of Boring at 40'					✷		**40.0**	

Boring/Well ID:	MMW-09S-A
CLIENT: AMMH	FIELD SCIENTIST: Gabriel Hebert
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/6/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/6/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT Geoprobe
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 19 ft
BORING LOCATION:	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	MMW-09S-A
0	AR		FILL: Brick, asphalt, gravel						
1					0.25				
2						25			
3					0.15				
4									
5	CL		SILTY CLAY, dark brown (10YR 3/3), slightly moist, stiff	5.0	0.05				
6						60			
7					0.15				
8									
9					0.1				
10						60			
11	SW		fine to coarse SAND, pale brown (10YR 6/3), slightly moist, with trace fine granules	11.0	0.2				
12									2" Dia. Borehole
13					2.1				
14						60			
15					2.5				
16									
17					4.2		S	16-18'	
18						60			
19			fine to medium SAND and fine to coarse GRANULES, gray (10YR 6/1), wet, loose	19.0	2.85				▼
20									
21					0.6				
22						60			
23					0.6				
24									

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: MMW-09S-A

CLIENT: AMMH	FIELD SCIENTIST: Gabriel Hebert
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/6/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/6/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT Geoprobe
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 19 ft
BORING LOCATION:	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	MMW-09S-A
24									
25					0.1				
26						60			
27					0.1				
28									
29					0.1				
30						100			
31					0.15				2" Dia. Borehole
32									
33					0.2		S	32-34'	
34						60			
35			SILTY CLAY, gray (10YR 5/1), moist, stiff	35.0	0.2				
36									
37					0.2				
38	CL					100			
39					0.2				
40			End of boring at 40 ft	40.0					
41									
42									
43									
44									
45									
46									
47									
48									

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-10S

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: South of Building 1
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 3 GW samples: MMW-10S (20'), (30'), (40'); SS: 14-16'

DATE BEGAN: 1/12/07
DATE FINISHED: 1/12/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
							0.0	
- blind drilled								
							5.0	
							10.0	
					✷		15.0	
								▼
					✷		20.0	
- Well set at 25'							25.0	
					✷		30.0	
							35.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-10S

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: South of Building 1
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 3 GW samples: MMW-10S (20'), (30'), (40'); SS: 14-16'

DATE BEGAN: 1/12/07
DATE FINISHED: 1/12/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
- End of Boring at 40'					✸		**40.0**	

Boring/Well ID: MMW-10S-A

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/6/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/6/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 16 ft
BORING LOCATION:	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments
0–4	AR		Fill brick, clay, rock	4.0	1.1 (0–2); NS (2–4)			H.A. to 3.5'
4–9.5	CL		SILTY CLAY, dark gray (10YR 4/1), slightly moist, with trace fine granules	9.5	0.1 (4–6); 0.0 (6–8); 0.05 (8–10)	87.5 (4–8); 45 (8–12)		
9.5–16.9	SW-GW		fine to coarse SAND with GRANULES, gray (10YR 5/1), slightly moist, loose; wet below 16 ft	16.9	0.15 (10–12); NR (12–14); NR (14–16)	0 (12–16)	S (11)	10-12'
16.9–17.8	ML		CLAYEY SILT, gray (10YR 6/1), very moist, soft, slightly plastic	17.8	0.0 (16–18); NR (18–20)	50 (16–20)		
17.8–24	SW		Fine to coarse SAND, grayish brown (10YR 5/2), wet, loose, non-plastic		0.0 (20–22); 0.0 (22–24)	65 (20–24)		

MMW-10S-A

2" Dia. Borehole

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed
NR = Not Recorded
H.A. = Hand Auger

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Boring/Well ID: MMW-10S-A

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/6/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/6/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 16 ft
BORING LOCATION:	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	MMW-10S-A
24–32.4	SW			32.4	0.0, 0.0, 0.0, 0.1	88, 100			2" Dia. Borehole
32.4–34.6			GRANULES with SAND, grayish brown (10YR 5/2), wet, loose, non-plastic	34.6	0.0	100			
34.6–40	CL		SILTY CLAY, gray (10YR 6/1), slightly moist, stiff, with trace coarse sand and fine granules, slightly plastic	40.0	0.0, 0.0, 0.0	100	S	34-36'	
40			End of Boring at 40 ft						

Depth scale: 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48

REMARKS:
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USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed
NR = Not Recorded
H.A. = Hand Auger

MUNDELL & ASSOCIATES, INC.
BORING LOG

BORING NO: MMW-11D

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: N of Bldg 10, W of Bldg 6
FIELD GEOLOGIST: April Nelson & Leena Lothe
NOTES:

DATE BEGAN: 6/1/07
DATE FINISHED: 6/1/07
DRILLING METHOD: Direct Push / HSA
DRILL EQUIP: Geoprobe 5400 / BK 51 HD
GW DEPTH (OBSERVED): 16'
DEPTH OF BORING: 36'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
ASPHALT: 3 - 4" of ASPHALT							0.0	
FILL: 6 - 8" of FILL gravel, BASE COURSE		0.25						
CL: SILTY CLAY with gravel, dry, very dk brown (10 YR 2/2)	CL	1.0		10%			5.0	
CL: SILTY CLAY with trace gravel, slightly moist, dk brown (10 YR 3/3)	CL	6.0		80%				
CL: SANDY CLAY with trace gravel, slightly moist, dk grayish brown (10 YR 4/2)	CL	6.5						
CL: SANDY CLAY with trace gravel, slightly moist, brown (10 YR 4/3)	CL	7.0						
SC: CLAYEY SAND with trace gravel, slightly moist, brown (10 YR 4/3)	SC	9.5		75%			10.0	
SW: MEDIUM SAND with trace gravel, slightly moist, brown (10 YR 5/3)	SW	11.0						
SW: MEDIUM TO COARSE SAND with gravel, slightly moist, brown (10 YR 4/3)	SW	13.0		65%			15.0	
SW: MEDIUM TO COARSE SAND with gravel, wet, brown (10 YR 4/3)	SW	16.0		65%				▼
- Blind drilled		20.0					20.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-11D

CLIENT: AIMCO	**DATE BEGAN:** 6/1/07 PAGE 2 OF 2
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED:** 6/1/07
PROJECT NAME: Michigan Meadows	**DRILLING METHOD:** Direct Push / HSA
PROJECT NO: M01046	**DRILL EQUIP:** Geoprobe 5400 / BK 51 HD
DRILLING CONTRACTOR: Midway Services, Inc.	**GW DEPTH (OBSERVED):** 16'
DRILLER: Mark Hicks / J.R. Todish	**DEPTH OF BORING:** 36'
BORING LOCATION: N of Bldg 10, W of Bldg 6	**TOP OF CASING ELEVATION:** N/A
FIELD GEOLOGIST: April Nelson & Leena Lothe	**SURFACE ELEVATION:** N/A
NOTES:	**COMMENTS:**

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
							25.0	
							30.0	
CL: SILTY CLAY, very hard and dense, dk gray (10 YR 4/1)	CL	32.0					35.0	
End of boring @ 36'		36.0						

Boring/Well ID: MMW-11D-A

Mundell Consulting Professionals for the Earth and the Environment

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/5/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/5/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT Geoprobe
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 16 ft
BORING LOCATION: 4' south of 11S/11D	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	MMW-11D-A
0–0.5			Soil	0.5					
0.5–4.0			Confirmed lithology to 4.0' with original soil boring log	4.0	NS	100		H.A. to 4'	
4.0–16.0			Blank drill 4.0'-16.0'	16.0					2" Dia. Borehole
16.0–21.2	SM		SILTY SAND, brown (10YR 5/2), wet, dense, non-plastic, fine to medium grained Gray (10 YR 5/1) below 17.0'	21.2	0.0 0.0	82.5			
21.2–24	SW		Fine to coarse grained SAND, brown (10YR 5/2), wet, dense, non-plastic		0.0 0.0	100			

REMARKS:
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TPV = Total Photoionizable Vapors
NS = Not Surveyed
H.A. = Hand Auger

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Boring/Well ID: MMW-11D-A

Mundell Consulting Professionals for the Earth and the Environment

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/5/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/5/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT Geoprobe
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 16 ft
BORING LOCATION: 4' south of 11S/11D	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	MMW-11D-A
24–27.1			GRANULES with some SAND, gray (10YR 5/1), wet, loose, non-plastic	27.1	0.0 (24–26); 1.0 (26–28)	75 (24–28)			
27.1–28.0	SW		Fine to medium grained SAND, gray (10YR 5/1), wet, dense, non-plastic	28.0					
28.0–30.3	SP		Fine SAND, gray (10YR 6/1), wet, dense, non-plastic	30.3	2.9 (28–30); 1.6 (30–32)	100 (28–32)			2" Dia. Borehole
30.3–32.1	SM		Fine to coarse grained SILTY SAND, gray (10YR 5/1), wet, loose, non-plastic	32.1					
32.1–34.0	CL		SILTY CLAY, gray (10YR 5/1), slightly moist, stiff, slightly plastic	34.0	0.0	100			

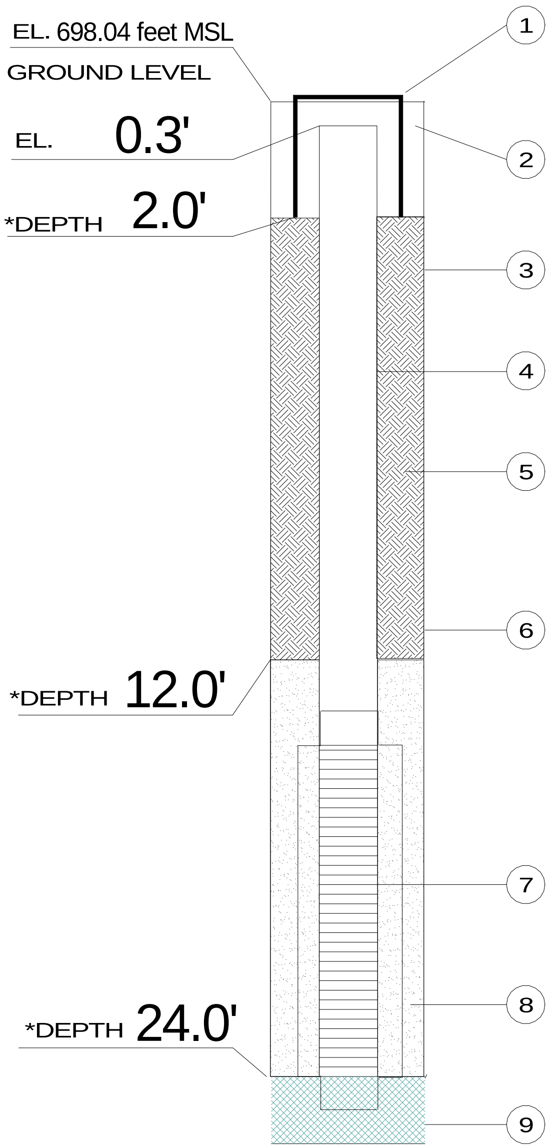
End of boring at 34.0'

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

H.A. = Hand Auger

WELL CONSTRUCTION DIAGRAM

WELL NO. MMW-11S



1. PROTECTIVE CASING I.D. 8 inches diameter, 12 inches deep
2. SURFACE SEAL TYPE Concrete
3. BOREHOLE DIAMETER 8.25 INCHES
4. RISER PIPE:
   a. Type PVC
   b. I.D. 2.0 INCHES
   c. Length 14 FEET
   d. Joint Type Threaded
5. BACKFILL:
   a. Type Bentonite chips
   b. Installation HSA
6. TYPE OF SEAL Bentonite chips
7. SCREEN:
   a. Type PVC (UPACK)
   b. I.D. 2.0 inner, 3.5 outer INCHES
   c. Slot Size 0.01 INCHES
   d. Length 9.5 screen, 10 total FEET
8. SCREEN FILTER TYPE #5 Sand
9. BACKFILL TYPE

DATE COMPLETED 11/26/08

DEVELOPMENT METHOD Geosquirt, Double Barrel Purge Pump

DRILLING CONTRACTOR Midway Services, Inc

DRILLER JR Todish

RIG TYPE Hollow Stem Auger BK 51 Heavy Duty

*DEPTH IN FEET BELOW GROUND LEVEL

GEOLOGIST/FIELD SCIENTIST
Leena Lothe

WELL CONSTRUCTION DIAGRAM

Michigan Meadows Apartments
3800 West Michigan Street
Indianapolis, Indiana

Project Number: M01046
Drawing File: MMW-9S.skf
Date Prepared: 6/17/09
Scale: Not to Scale

Drn. By:	Ckd. By:	Approved By:
AN	LL	JM

MUNDELL & ASSOCIATES INC.

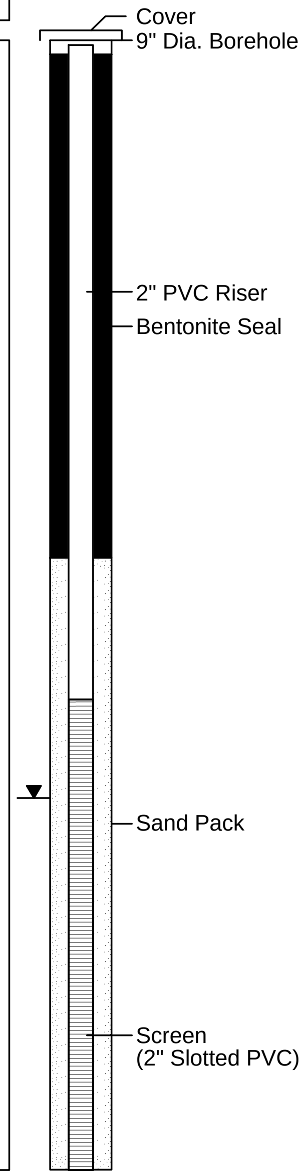
110 S Downey Avenue
Indianapolis, Indiana

Boring/Well ID: MW-11S

CLIENT: AIMCO	FIELD GEOLOGIST: LL/GH
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 11/26/08
PROJECT NAME: Michigan Meadows	DATE FINISHED: 11/26/08
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe/Direct Push
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT:
DRILLER: Marty Hicks	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0	GW		Fill	0.5				
	CL		Very dark brown (10YR 2/2), dry, SILTY CLAY, no odor	7.0				
5								
	SC		(10YR 3/3), , dry, SANDY CLAY Gravel matrix below 9 ft-bgs	10.0				
10	SP		Brown (10YR 4/3), dry, SAND, poorly graded, fine grained, no odor	11.0				
	SW		Brown (10YR 4/3), slightly moist, SAND, well graded, medium grained, no odor Brown (10YR 5/3) below 16 ft-bgs	16.0 17.0				
15								
20	SW		Wet at 17 ft-bgs	24.0				
			Bottom of the boring at 24 ft-bgs					
25								

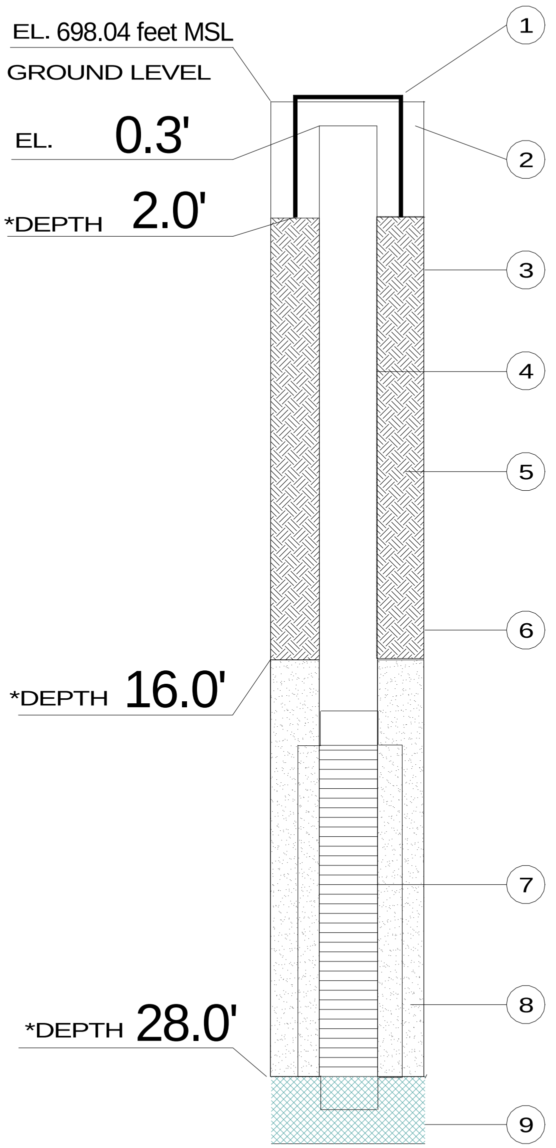
MW-11S



TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

WELL CONSTRUCTION DIAGRAM

WELL NO. MMW-12S



*DEPTH IN FEET BELOW GROUND LEVEL

1. PROTECTIVE CASING I.D. 8 inches diameter, 12 inches deep
2. SURFACE SEAL TYPE Concrete
3. BOREHOLE DIAMETER 8.25 INCHES
4. RISER PIPE:
   a. Type PVC
   b. I.D. 2.0 INCHES
   c. Length 18 FEET
   d. Joint Type Threaded
5. BACKFILL:
   a. Type Bentonite chips
   b. Installation HSA
6. TYPE OF SEAL Bentonite chips
7. SCREEN:
   a. Type PVC (UPACK)
   b. I.D. 2.0 inner, 3.5 outer INCHES
   c. Slot Size 0.01 INCHES
   d. Length 9.5 screen, 10 total FEET
8. SCREEN FILTER TYPE #5 Sand
9. BACKFILL TYPE

DATE COMPLETED 11/26/08

DEVELOPMENT METHOD Geosquirt, Double Barrel Purge Pump

DRILLING CONTRACTOR Midway Services, Inc

DRILLER JR Todish

RIG TYPE Hollow Stem Auger BK 51 Heavy Duty

GEOLOGIST/FIELD SCIENTIST Leena Lothe

WELL CONSTRUCTION DIAGRAM

Michigan Meadows Apartments
3800 West Michigan Street
Indianapolis, Indiana

Project Number: M01046

Drawing File: MMW-9S.skf

Date Prepared: 6/17/09

Scale: Not to Scale

Drn. By: AN | Ckd. By: LL | Approved By: JM

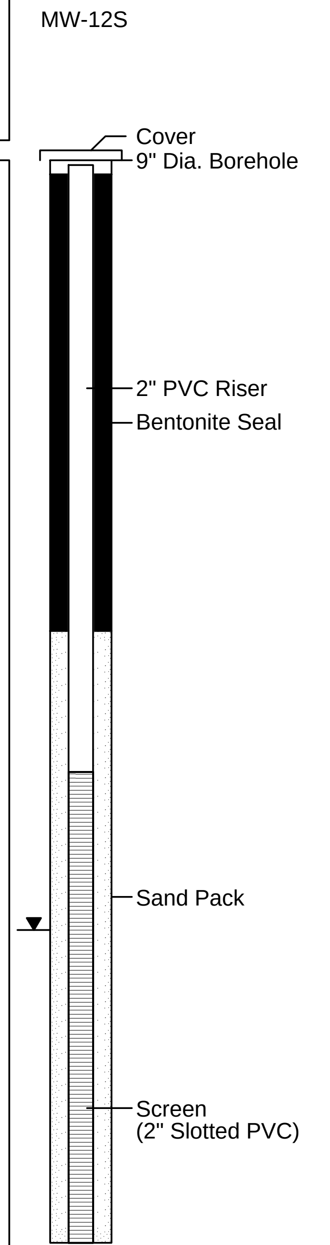
MUNDELL & ASSOCIATES INC.

110 S Downey Avenue
Indianapolis, Indiana

Boring/Well ID: MW-12S

CLIENT: AIMCO	FIELD GEOLOGIST: LL/GH
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 11/26/08
PROJECT NAME: Michigan Meadows	DATE FINISHED: 11/26/08
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe/Direct Push
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT:
DRILLER: Marty Hicks	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0	GR		Grass, topsoil	0.33				
	CL		Dark gray, slightly moist, SILTY CLAY, fine to medium grained, no odor	11.0				
	SW		Dark gray, dry, SAND, well graded, fine to medium grained, with gravel matrix, no odor	16.0				
	CL		Clay layer at 16 ft-bgs	16.25				
	SW		Light gray 2.5 Y 7/2, , wet, SAND, well graded, fine to medium coarse grained, no odor	24.0				
	SW		Bottom of the boring at 24 ft-bgs					



TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

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WELL CONSTRUCTION DIAGRAM

WELL NO. MMW-13D

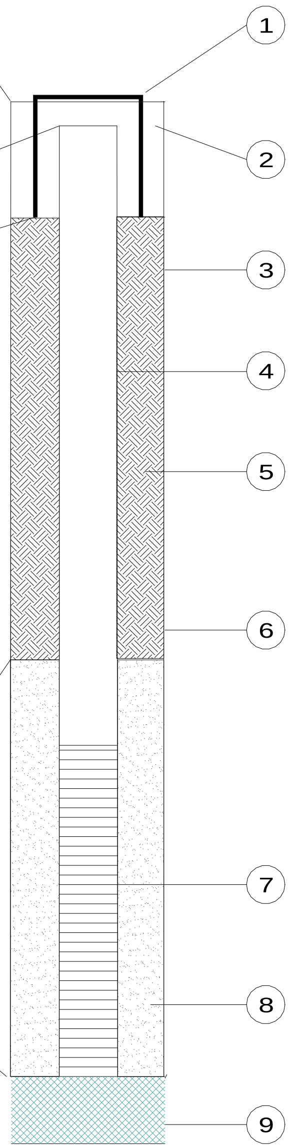
EL. 698.04 feet MSL
GROUND LEVEL

EL. 0.3'

*DEPTH 2.0'

*DEPTH 33.0'

*DEPTH 50.0'



*DEPTH IN FEET BELOW GROUND LEVEL

GEOLOGIST/FIELD SCIENTIST Leena Lothe

1. PROTECTIVE CASING I.D. 8 inches diameter, 12 inches deep
2. SURFACE SEAL TYPE Concrete
3. BOREHOLE DIAMETER 8.25 INCHES
4. RISER PIPE:
   a. Type PVC
   b. I.D. 2.0 INCHES
   c. Length 35 FEET
   d. Joint Type Threaded
5. BACKFILL:
   a. Type Bentonite chips
   b. Installation HSA
6. TYPE OF SEAL Bentonite chips
7. SCREEN:
   a. Type PVC (UPACK)
   b. I.D. 2.0 inner, 3.5 outer INCHES
   c. Slot Size 0.01 INCHES
   d. Length 15' screen FEET
8. SCREEN FILTER TYPE #5 Sand
9. BACKFILL TYPE

DATE COMPLETED 11/21/08

DEVELOPMENT METHOD Geosquirt, Double Barrel Purge Pump

DRILLING CONTRACTOR Midway Services, Inc

DRILLER JR

RIG TYPE Hollow Stem Auger BK 51 Heavy Duty

WELL CONSTRUCTION DIAGRAM

Michigan Meadows Apartments
3800 West Michigan Street
Indianapolis, Indiana

Project Number: M01046	
Drawing File: MMW-9S.skf	
Date Prepared: 6/17/09	
Scale: Not to Scale	
Drn. By: AN	Ckd. By: LL	Approved By: JM

MUNDELL & ASSOCIATES INC.
110 S Downey Avenue
Indianapolis, Indiana

MUNDELL & ASSOCIATES

caring for the earth and all it holds

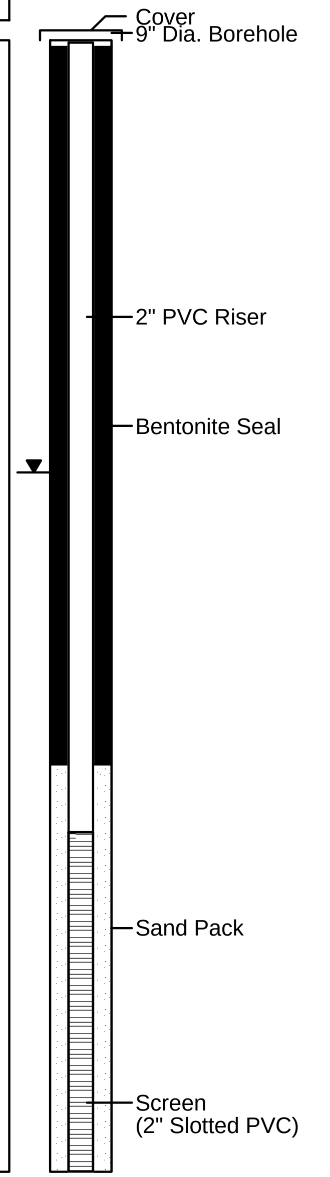
Boring/Well ID: MW-13D

CLIENT: AIMCO	FIELD GEOLOGIST: LL
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 11/21/08
PROJECT NAME: Michigan Meadows	DATE FINISHED: 11/26/08
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe/Direct Push
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT:
DRILLER: JR	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)
0	GR	Grass, topsoil	0.16
0.16–5	CL	Dark olive brown, 2.5 Y 3/3, dry, SILTY CLAY, no odor	5.0
5–12	SP	Dark olive brown 2.5 Y 3/3, dry, SAND, poorly graded, fine grained, with gravel matrix, no odor	12.0
12–14	CL	No Recovery from 8-12 ft-bgs	14.0
		Dark Gray (10 YR 4/1), dry, SILTY CLAY, with gravel matrix, no odor, CLAY layer at 16 ft-bgs	
14–20	SW	Dark gray (10YR 4/1), dry, SAND, well graded, no odor	20.0
		Wet at 17 to 18 ft bgs	
20–24	SW	Water at 19 to 20 ft-bgs	24.0
		2.5 Y 7/2. wet, SAND, well graded, fine to medium grainded, with gravel matric, no odor	
		Blank drilled from 24 ft-bgs	
50		Bottom of Boring at 50 ft-bgs	

Depth interval (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0–1	NA	60		
1–2	0.2			
2–3	0.2			
3–4	0.6			
4–5	NA	75		
5–6	0.2			
6–7	0.3			
7–8	1.0			
8–9	NA	NR		
9–10	NA			
10–11	NA			
11–12	NA			
12–13	NA	75		
13–14	1.2			
14–15	0.8			
15–16	0.7			
16–17	0.4			
17–18	0.2			
18–19	0.2			
19–20	0.2			

MW-14D



TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Boring/Well ID: MMW-13D-A

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/5/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/11/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 20 ft
BORING LOCATION: 3' NW of MMW-8S	SURFACE ELEVATION: NS
	SHEET 1 OF 4

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments
0–4	CL		SILTY CLAY, yellowish brown, slightly moIst (confirming lithology to original boring)	4.0				
4–20			Blank Drill 4 ft to 20 ft					

MMW-13D-A

2" Dia. Borehole

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

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Boring/Well ID: MMW-13D-A

Mundell Consulting Professionals for the Earth and the Environment

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/5/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/11/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 20 ft
BORING LOCATION: 3' NW of MMW-8S	SURFACE ELEVATION: NS
	SHEET 2 OF 4

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	MMW-13D-A
20–21	SP		fine SAND, gray (10 YR 6/1), loose, wet, non-plastic, with trace granules	21.0					
21–24	SW		fine to coarse SAND, gray (10 YR 6/1), loose, wet, non-plastic	24.0		80			
24–25.6	SP		fine SAND, gray (10 YR 6/1), loose, wet, non-plastic, with trace granules	25.6	0.0	78			
25.6–37.4	SW-GW		fine to coarse SAND and fine to coarse GRANULES, brown (10 YR 5/4), loose, wet, non-plastic, granules subangluar to rounded	37.4	0.0 (27); NR (29); NR (31); 0.2 (33); 0.1 (35); 0.0 (37)	0 (28–32); 100 (32–36)			2" Dia. Borehole
37.4–39.0	CL		SILTY CLAY, dark gray (10 YR 4/1), medium stiff, slightly moist, slightly plastic, with some subangular granules	39.0		100			
39.0–40	SW		fine to medium SAND, gray (10 YR 6/1), dense, wet, non-plastic		1.9				

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Boring/Well ID: MMW-13D-A

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/5/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/11/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 20 ft
BORING LOCATION: 3' NW of MMW-8S	SURFACE ELEVATION: NS

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	MMW-13D-A
40–43.1	SP	fine SAND, gray (10 YR 6/1), dense, wet, non-plastic	43.1	0.0 (41); 0.0 (43)	100			
43.1–48	SW-F42	CLAYEY SAND and fine to coarse GRANULES, gray (10 YR 6/1), loose, very moist to wet, non-plastic, with small piece of clay mixed in at 43.2 ft	48.0	0.05 (45); NR (47)	50			
48–51	SW-GW	SAND and fine to coarse GRANULES, gray (10 YR 6/1), loose, very moist to wet, non-plastic	51.0	0.0 (49); 2.0 (51)	100			2" Dia. Borehole
51–58.5	SW	fine to medium SAND, gray (10 YR 6/1), loose, wet, non-plastic thin (0.01 ft) fragment of shale at 52 ft	58.5	0.05 (53); 1.65 (55); 1.35 (57)	100; 78	S	56-58' (DUP-2)	
58.5–59	SW-GW	fine to coarse SAND and fine to coarse GRANULES, gray (10YR 6/1), wet, loose, non-plastic	59.0	0.6 (59)	78	S	58-60'	
59–60	CL	SANDY SILTY CLAY, very dark gray (10YR 3/1), slightly moist, medium stiff, slightly plastic						

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Boring/Well ID: MMW-13D-A

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/5/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/11/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 20 ft
BORING LOCATION: 3' NW of MMW-8S	SURFACE ELEVATION: NS
	SHEET 4 OF 4

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	MMW-13D-A
60	CL			61.0	0.3	80			2" Dia. Borehole
61									
62			End of boring at 61 ft						
63									
64									
65									
66									
67									
68									
69									
70									
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									

REMARKS:
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WELL CONSTRUCTION DIAGRAM

WELL NO. MMW-14D

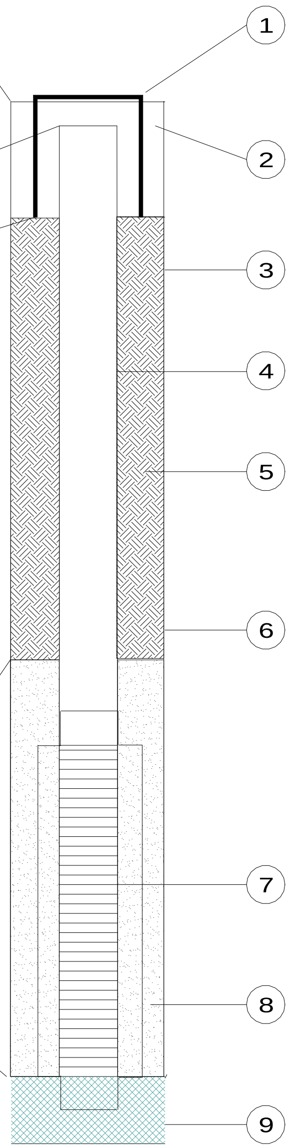
EL. 698.04 feet MSL
GROUND LEVEL

EL. 0.3'

*DEPTH 2.0'

*DEPTH 38.0'

*DEPTH 50.0'



*DEPTH IN FEET BELOW GROUND LEVEL

1. PROTECTIVE CASING I.D. 8 inches diameter, 12 inches deep
2. SURFACE SEAL TYPE Concrete
3. BOREHOLE DIAMETER 8.25 INCHES
4. RISER PIPE:
   a. Type PVC
   b. I.D. 2.0 INCHES
   c. Length 40 FEET
   d. Joint Type Threaded
5. BACKFILL:
   a. Type Bentonite chips
   b. Installation HSA
6. TYPE OF SEAL Bentonite chips
7. SCREEN:
   a. Type PVC (UPACK)
   b. I.D. 2.0 inner, 3.5 outer INCHES
   c. Slot Size 0.01 INCHES
   d. Length 9.5 screen, 10 total FEET
8. SCREEN FILTER TYPE #5 Sand
9. BACKFILL TYPE

DATE COMPLETED 12/10/08

DEVELOPMENT METHOD Geosquirt, Double Barrel Purge Pump

DRILLING CONTRACTOR Midway Services, Inc

DRILLER Marty Hicks

RIG TYPE Hollow Stem Auger BK 51 Heavy Duty

GEOLOGIST/FIELD SCIENTIST Leena Lothe

WELL CONSTRUCTION DIAGRAM

Michigan Meadows Apartments
3800 West Michigan Street
Indianapolis, Indiana

Project Number: M01046
Drawing File: MMW-9S.skf
Date Prepared: 6/17/09
Scale: Not to Scale
Drn. By: AN | Ckd. By: LL | Approved By: JM

MUNDELL & ASSOCIATES INC.
110 S Downey Avenue
Indianapolis, Indiana

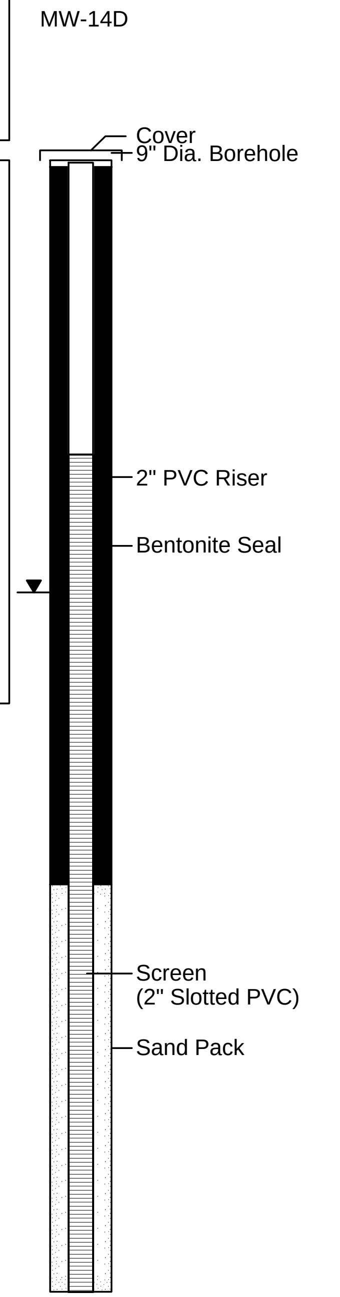
Boring/Well ID:	**MW-14D**

CLIENT: AIMCO	FIELD GEOLOGIST: LL
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 12/10/08
PROJECT NAME: Michigan Meadows	DATE FINISHED: 11/26/08
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe/Direct Push
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: 5410 & HSA
DRILLER: Midway	GW DEPTH (OBSERVED):
BORING LOCATION: West of Bldg 2	SURFACE ELEVATION:
	SHEET 1 OF 1

USCS Symbol	Lithologic Description	Stratum Depth (ft)
GR	Grass, topsoil	0.16
CL	Dark brown, slightly moist, SILTY CLAY, with trace sand, no odor, grass roots observed	2.0
CL	Dark brown (10YR 3/3), dry, SILTY CLAY, fine to medium grained sand, , no odor	7.5
SW	Light gray (2.5 Y 7/2), dry, SAND, well graded, fine to medium grained, with gravel matrix, no odor Cobble layer at 8 ft-bgs Cobble layer at 15 to 16 ft-bgs	15.0
SW	Wet at 16 ft-bgs	16.0
CL	Clay seam at 17 ft-bgs with trace sand	17.0
SW	, SAND, well graded	17.33
	Blank drilled from 24 ft-bgs	24.0
	Bottom of the boring at 50 ft-bgs	50

TPV (ppm)	Recovery %
0.2, 0.2, 0.6, 0.6	60
NA, 2.2, 0.8, 0.8	75
2.4, 2.1, 0.8, 0.8	70
NA, 0.7, 0.2, 0.4	75
1.0, NA, 2.4, 2.8	60
NA, 3.2, 3.3	50

Sample Location | Sample ID



TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
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Boring/Well ID: MMW-14D-A

Mundell Consulting Professionals for the Earth and the Environment

CLIENT: AMMH	FIELD SCIENTIST: Gabriel Hebert/Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/6/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/11/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT Geoprobe
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 20 ft
BORING LOCATION:	SURFACE ELEVATION: NS
	SHEET 1 OF 4

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments
0–4	CL		SILTY CLAY, dark brown, slightly moist (confirmed lithology to original soil boring)					H.A. to 4 ft
4–20			Blank drill 4 ft to 20 ft					

MMW-14D-A

2" Dia. Borehole

REMARKS:
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TPV = Total Photoionizable Vapors
NS = Not Surveyed

H.A. = Hand Auger

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Boring/Well ID: MMW-14D-A

CLIENT: AMMH	FIELD SCIENTIST: Gabriel Hebert/Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/6/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/11/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT Geoprobe
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 20 ft
BORING LOCATION:	SURFACE ELEVATION: NS
	SHEET 2 OF 4

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	MMW-14D-A
20	SW		fine to coarse SAND, pale brown (10YR 6/3), wet, non-plastic	20.0					
21					0.1				
22						100			
23	CL		SILTY CLAY, gray (10YR 6/1), slightly moist, stiff	23.0	0.2				
24	SW		fine to coarse SAND, pale brown (10YR 6/3), wet, non-plastic	24.0					
25					0.55				
26						75			
27					0.65				
28									
29					1.3				
30			GRANULES with SAND, pale brown (10YR 6/3), wet, non-plastic	30.0		90			2" Dia. Borehole
31					1.05				
32									
33					3.9				
34						75			
35					3.25				
36	CL		SILTY CLAY, gray (10YR 6/1), moist, stiff	36.0					
37			SAND and GRANULES, light grayish brown (10YR 6/2), wet, non-plastic	37.0	2.2				
38						100			
39					5.4				
40									

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H.A. = Hand Auger

Boring/Well ID: MMW-14D-A

CLIENT: AMMH	FIELD SCIENTIST: Gabriel Hebert/Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/6/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/11/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT Geoprobe
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 20 ft
BORING LOCATION:	SURFACE ELEVATION: NS
	SHEET 3 OF 4

Mundell Consulting Professionals for the Earth and the Environment

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments
40							
41				15.3			
42		fine to coarse GRANULES with some fine to coarse SAND, gray (10YR 6/1), wet, non-plastic	42.0		75		
43				9.95			
44		fine to coarse SAND, gray (10YR 6/1), wet, with some fine to coarse granules, non-plastic	44.0				
45				18.4		S	44-46'
46					100		
47				9.25			
48	SW						
49				5.5			
50					100		
51				6.2		S	50-52'
52							
	CL	SILTY CLAY, gray (10YR 5/1), slightly moist, stiff	52.4				
53				2.4			
	SW-GW	fine to coarse SAND and fine to coarse GRANULES, gray (10YR 6/1), wet, loose, non-plastic	53.2				
54					80		
55				1.85			
	SP	fine SAND, light gray (10YR 7/1), wet, dense, non-plastic	55.1				
56	SW	fine to medium SAND, gray (10YR 6/1), wet, medium dense, non-plastic	56.0				
		fine to coarse SAND and fine to coarse GRANULES, gray (10YR 6/1), wet, loose	56.5				
57				0.2			
58					58		
59				0.65			
60							

MMW-14D-A

2" Dia. Borehole

REMARKS:
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TPV = Total Photoionizable Vapors
NS = Not Surveyed

H.A. = Hand Auger

Boring/Well ID: MMW-14D-A

CLIENT: AMMH	FIELD SCIENTIST: Gabriel Hebert/Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/6/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/11/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT Geoprobe
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 20 ft
BORING LOCATION:	SURFACE ELEVATION: NS
	SHEET 4 OF 4

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	MMW-14D-A
60									
61					1.05				
62						100			
63					0.75				2" Dia. Borehole
64			fine SAND, gray (10YR 6/1), wet, very dense, non-plastic	64.0					
65					0.6				
66	SP					100			
67			Refusal at 67 ft (driller notes refusal occured within sand)	67.0	0.45				
68									
69									
70									
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									

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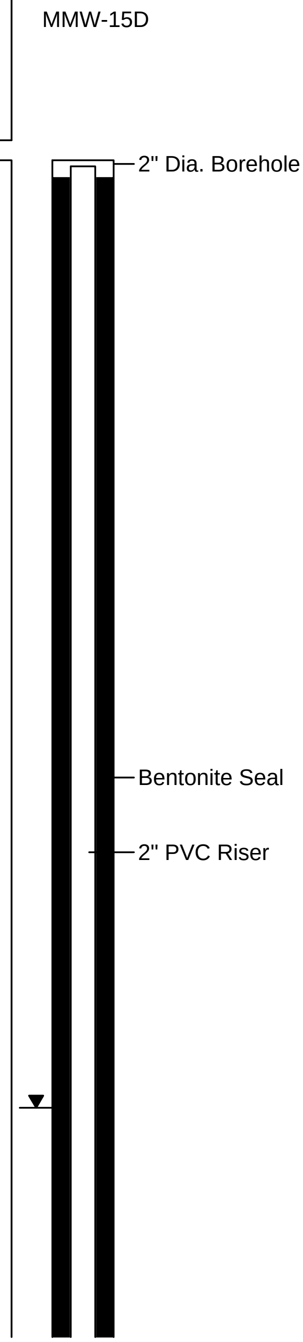
NS = Not Surveyed

H.A. = Hand Auger

Boring/Well ID: MMW-15D

CLIENT: AIMCO	FIELD SCIENTIST: Pilar Cuadra
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/15/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/15/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 16.0 ft
BORING LOCATION: E of Holt Rd, N of Mich St	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Blow Count	Sample ID
0 – 0.5			Grass/Topsoil	0.5					
0.5 – 2.5	CL		SILTY CLAY with trace gravel, brown (10YR 5/3), soft, moist	2.5	0.1 (0–2)	100 (0–4)			
2.5 – 9.5	SW-GW		SAND and GRAVEL, well graded, brown (10YR 5/3), loose, moist	9.5	0.2 (2–4)				
					0.2 (4–6)	50 (4–8)			
			No Recovery 6.0 to 8.0 ft		- (6–8)				
					0.2 (8–10)	75 (8–12)			
9.5 – 12.5	SM		SILTY SAND with trace gravel, brown (10YR 5/3), loose, moist	12.5	0.2 (10–11)				
			No Recovery 11.0 - 12.0 ft		- (11–12)				
12.5 – 17.5	SW-GW		SAND and GRAVEL, well graded, brownish gray (10YR 6/3), loose, moist	17.5	0.1 (12–14)	75 (12–16)	*		Soil Sample: MMW-15D 13.0 - 15.0'
					0.2 (14–15)				
			No Recovery 15.0 -16.0 ft		- (15–16)				
			Wet at 16.0 ft		0.3 (16–18)	88 (16–20)			
17.5 – 20	SW		SAND, well graded, brownish gray (10YR 6/3), loose, moist		0.2 (18–19.5)				
			No Recovery 19.5 - 20.0 ft		- (19.5–20)				



REMARKS:
BGS = Below Ground Surface
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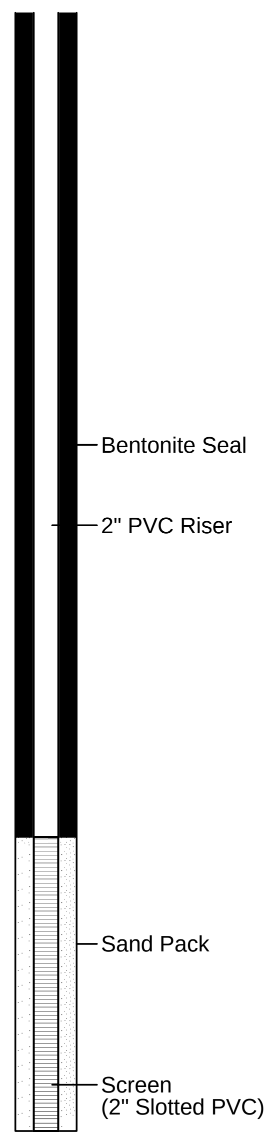
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: MMW-15D

CLIENT: AIMCO	FIELD SCIENTIST: Pilar Cuadra
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/15/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/15/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 16.0 ft
BORING LOCATION: E of Holt Rd, N of Mich St	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Blow Count	Sample ID
20									
21					0.2				
22					0.3	63			
23			No Recovery 22.5 - 24.0 ft		-				
24									
25					0.4				
26						100			
27					0.3				
28							*		Water Sample: MMW-15D 28.5'
29	SW				0.1				
30						100			
31					0.2				
32									
33					0.2				
34						100			
35					0.7				
36									
37					0.1	100			Water Sample: MMW-15D 38.5'
38				38.5	0.8		*		Soil Sample: MMW-15D 38.5 - 39.0'
39	CL		SILTY CLAY with trace gravel, brownish gray (10YR 6/3), moist, stiff	39.0					
40			End of boring at 39 ft						

MMW-15D

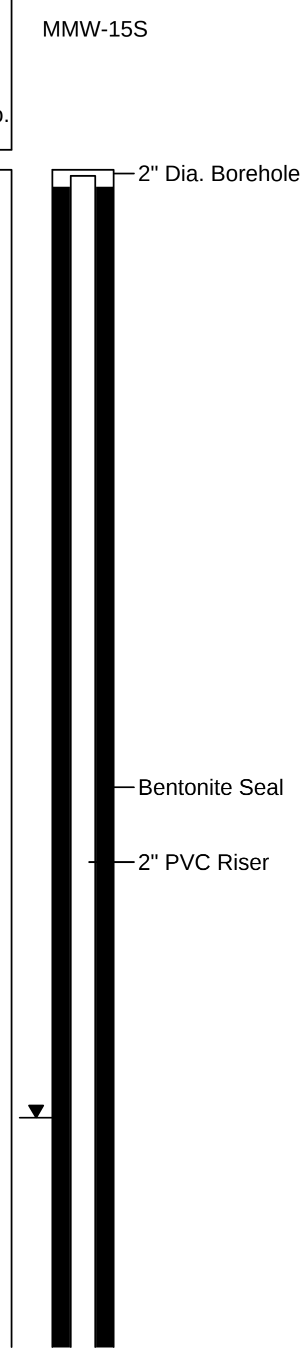


REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: MMW-15S

CLIENT: AIMCO	FIELD SCIENTIST: Pilar Cuadra
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/15/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/15/11
PROJECT NUMBER: M01046	DRILLING METHOD: Hollow Stem Auger
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: CME 75
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 16.0 ft
BORING LOCATION: E of Holt, N of Mich St	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Blow Count	Lab No.
0		Topsoil / Grass	0.5				
1	CL	SILTY CLAY with trace gravel, brown (10YR 5/3), soft, moist		-			
2			2.5		100		
3	SW-GW	SAND and GRAVEL, well graded, brown (10YR 5/3), loose, moist		0.1			
4		Hand augured to 5.0 ft					
5				0.1	88	4/2/2/3	
6		No Recovery 5.5 - 6.0 ft		-			
7		yellowish red (5YR 5/8) oxidation from 6.0-7.5 ft		0.2	88	8/7/6/7	
8		No Recovery 7.5 - 8.0 ft		-			
9				0.2	88	9/8/8/9	
10		No Recovery 9.5 - 10.0 ft		-			
11	SM	SILTY SAND with trace gravel, brown (10YR 5/3), loose, moist	11	0.2	100	7/7/7/6	
12							
13			13.5	0.2	100	6/6/12/3	
14	SW-GW	SAND and GRAVEL, well graded, brownish gray (10YR 6/2), loose, moist					
15				0.2	88	6/12/15/11	
16		No Recovery 15.5 -16.0 ft	16.0	-			
17	SW	SAND, well graded, brownish gray (10YR 6/2), loose; wet at 16 ft		0.1	100	7/13/16/16	
18			18.5				
19	SW-GW	SAND and GRAVEL, well graded, brownish gray (10YR 6/2), loose, wet		0.2	100	7/13/13/17	
20							



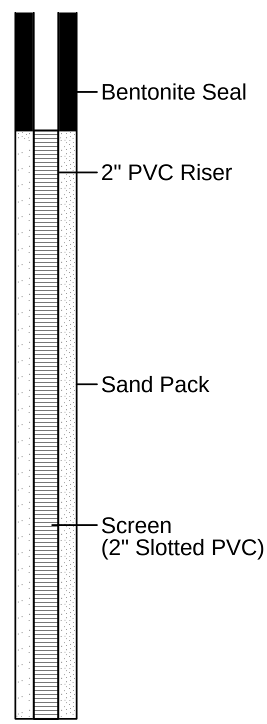
REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: MMW-15S

CLIENT: AIMCO	FIELD SCIENTIST: Pilar Cuadra
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/15/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/15/11
PROJECT NUMBER: M01046	DRILLING METHOD: Hollow Stem Auger
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: CME 75
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 16.0 ft
BORING LOCATION: E of Holt, N of Mich St	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Blow Count	Lab No.
20								
21					0.3	88	7/6/6/10	
22			No Recovery 21.5 - 22 ft		-			
23					0.2	100	6/7/8/10	
24								
25					0.4	100	6/11/11/11	
26	SW-GW							
27					0.4	100	7/8/12/13	
28								
29					0.4	100	6/8/15/22	
30								
31					0.3	100	4/8/12/12	
32			End of boring at 32.0 ft	32				
33								
34			See MMW-15D for soil & groundwater sampling information					
35								
36								
37								
38								
39								
40								

MMW-15S



REMARKS:
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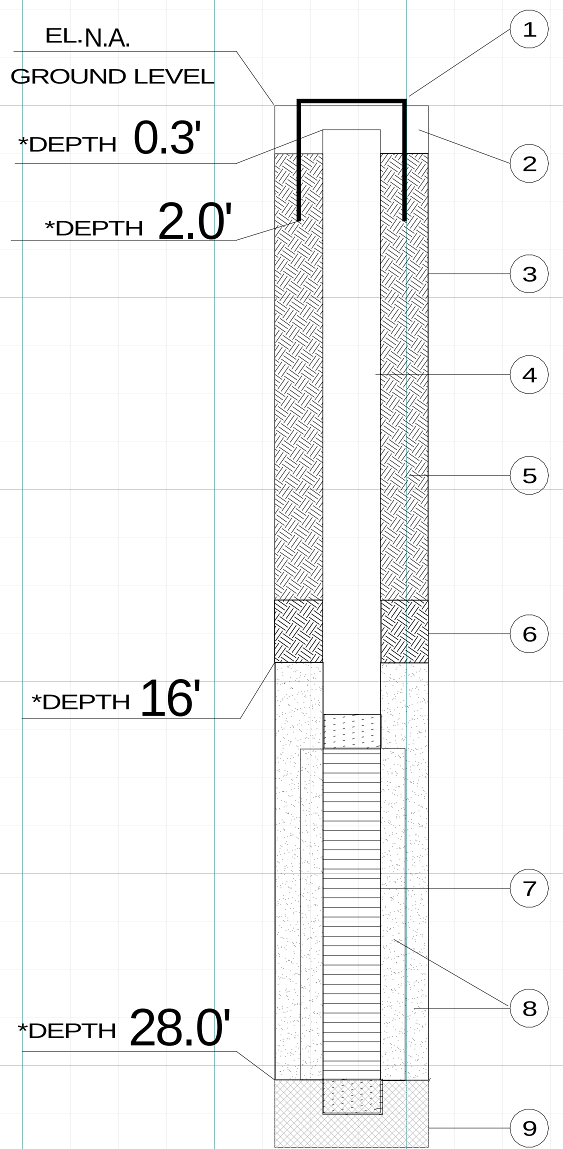
WELL CONSTRUCTION DIAGRAM

WELL NO. MMW-C-1



*DEPTH IN FEET BELOW GROUND LEVEL

1. PROTECTIVE CASING I.D. 8 inch diameter 12 inches deep
2. SURFACE SEAL TYPE Concrete
3. BOREHOLE DIAMETER 8.25 INCHES
4. RISER PIPE:
   a. Type PVC
   b. I.D. 2.0 INCHES
   c. Length 35 FEET
   d. Joint Type Threaded
5. BACKFILL:
   a. Type Bentonite grout
   b. Installation Poured
6. TYPE OF SEAL
7. SCREEN:
   a. Type PVC (UPACK)
   b. I.D. 2.0 inner, 3.5 outer INCHES
   c. Slot Size 0.01 INCHES
   d. Length 9.5 screen, 10 total FEET
8. SCREEN FILTER TYPE #5 Sand U-Pack
9. BACKFILL TYPE

DATE COMPLETED 8/01/08

DEVELOPMENT METHOD Well Pump

DRILLING CONTRACTOR Midway Services, Inc

DRILLER JR Todish/Mark Hicks/Jeff/Zach

RIG TYPE BK 51 Heavy Duty

GEOLOGIST/FIELD SCIENTIST
Leena Lothe / Gabriel Herbert/ Karen Rea

WELL CONSTRUCTION DIAGRAM

Michigan Plaza
Floral Park Cemetery Property
Indianapolis, Indiana

Project Number: M01046

Drawing File: MMW-C-01

Date Prepared: 8/7/08

Scale: Not to Scale

Drn. By: KR | Ckd. By: LL | Approved By: JM

Mundell & Associates, Inc.

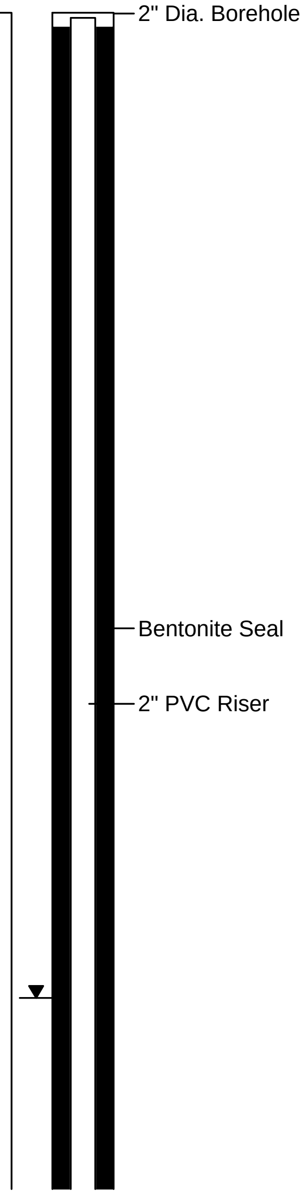
110 S. Downey Avenue
Indianapolis, Indiana 46219

Boring/Well ID: MMW-C-02D

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/5/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/6/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 20.0 ft
BORING LOCATION: S. of Plaza	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0 – 0.5		Grass/Topsoil	.50				
0.5 – 4	SM	SILTY SAND with trace of gravel, brown (10YR 5/3), dense, moist No recovery 3.0 - 4.0 ft	4	1.8 (0-2) 2.1 (2-3) - (3-4)	75		
4 – 8	SW	SAND with trace gravel, well graded, brown (10YR 5/3), loose, dry	8	1.6 (4-6) 1.1 (6-8)	100		
8 – 17.5	SM	Fine to medium grained SAND with trace gravel, well graded, brown (10YR 5/3), loose, dry	17.5	1.7 (8-10) 1.9 (10-12) 2.4 (12-14) 2.0 (14-16) 1.0 (16-17)	100 (8-12) 100 (12-16)		
17.5 – 24	SP	Fine to medium grained SAND, poorly graded, brown (10YR 5/3), dense, moist yellowish red (5YR 5/8) oxidation from 17.5 - 19.0 ft No Recovery 19.0 - 20.0 ft Wet at 20.0 ft Significant sand heaving problems from 20.0 - 22.0 ft No Recovery 22.0 - 24.0 ft		1.1 (17-19) - (19-20) 0.9 (20-22) - (22-24)	75 (16-20) 50 (20-24)	* *	Soil Sample: MMW-C-02D 17.5-19.0' Water Sample: MMW-C-02D 22.0'

MMW-C-02D



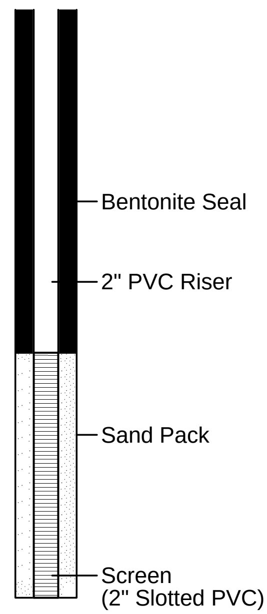
REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: MMW-C-02D

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/5/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/6/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 20.0 ft
BORING LOCATION: S. of Plaza	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
24			Fine to coarse grained SAND and GRAVEL, well graded, gray (2.5Y 5/1), dense, wet					
25					0.6			
26						100		
27					0.4			
28								
29					0.6			
30	SW-GW					100		
31					0.5			
32			Significant sand heaving problems from 28.0 - 36.0 ft				*	Water Sample: MMW-C-02D 32.0'
33					0.2			
34						100		
35					0.1			
36			SILTY CLAY, Gray (2.5YR 5/1) very stiff, moist	36				
37					0.1			
38	CL					100		
39					0.1			
40			SILTY CLAY, gray (2.5Y 5/1), very stiff, moist	40			*	Soil Sample: MMW-C-02D 40.0 - 42.0'
41	CL				0.2	100		
42			End of Boring at 42.0 ft				*	Water Sample: MMW-C-02D 42.0'
43								
44								
45								
46								
47								
48								

MMW-C-02D



REMARKS:
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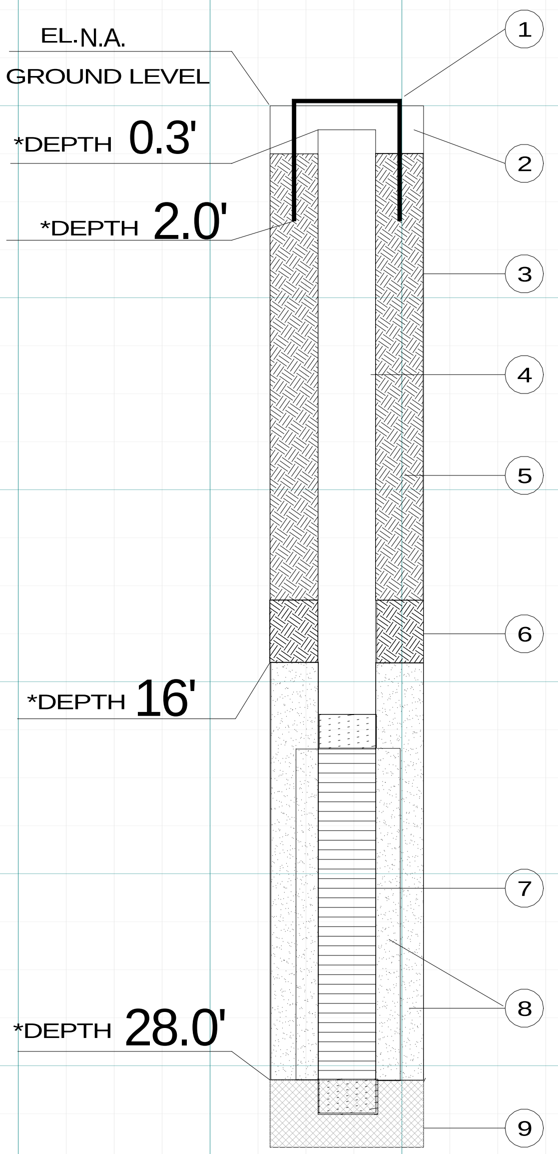
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

WELL CONSTRUCTION DIAGRAM

WELL NO. MMW-C-2



*DEPTH IN FEET BELOW GROUND LEVEL

1. PROTECTIVE CASING I.D. 8 inch diameter 12 inches deep
2. SURFACE SEAL TYPE Concrete
3. BOREHOLE DIAMETER 8.25 INCHES
4. RISER PIPE:
   - a. Type PVC
   - b. I.D. 2.0 INCHES
   - c. Length 35 FEET
   - d. Joint Type Threaded
5. BACKFILL:
   - a. Type Bentonite grout
   - b. Installation Poured
6. TYPE OF SEAL
7. SCREEN:
   - a. Type PVC (UPACK)
   - b. I.D. 2.0 inner, 3.5 outer INCHES
   - c. Slot Size 0.01 INCHES
   - d. Length 9.5 screen, 10 total FEET
8. SCREEN FILTER TYPE #5 Sand U-Pack
9. BACKFILL TYPE

DATE COMPLETED 8/01/08

DEVELOPMENT METHOD Well Pump

DRILLING CONTRACTOR Midway Services, Inc

DRILLER JR Todish/Mark Hicks/Jeff/Zach

RIG TYPE BK 51 Heavy Duty

GEOLOGIST/FIELD SCIENTIST
Leena Lothe / Gabriel Herbert/ Karen Rea

WELL CONSTRUCTION DIAGRAM

Michigan Plaza
Floral Park Cemetery Property
Indianapolis, Indiana

Project Number: M01046
Drawing File: MMW-C-02
Date Prepared: 8/7/08
Scale: Not to Scale
Drn. By: KR | Ckd. By: LL | Approved By: JM

Mundell
& Associates, Inc.

110 S. Downey Avenue
Indianapolis, Indiana 46219

BORING NUMBER:MMW-C-16D

CLIENT: AMMH	FIELD GEOLOGIST:Mark Breting
PROJECT LOCATION: Indianapolis, IN	COORDINATES:
PROJECT NAME:Michigan Plaza	DRILLING DATE:6/4/2012
PROJECT NUMBER:M01046	DRILLING METHOD:HSA/Split Spoon
DRILLING CONTRACTOR:ATC Assoc. Inc.	DRILLING EQUIPMENT:Dietrich D-50
DRILLER: Warren Bates	GW DEPTH (OBSERVED):22.15 ft-bgs
BORING LOCATION:Floral Park Cemetery	SURFACE ELEVATION:

SHEET 1 OF 1

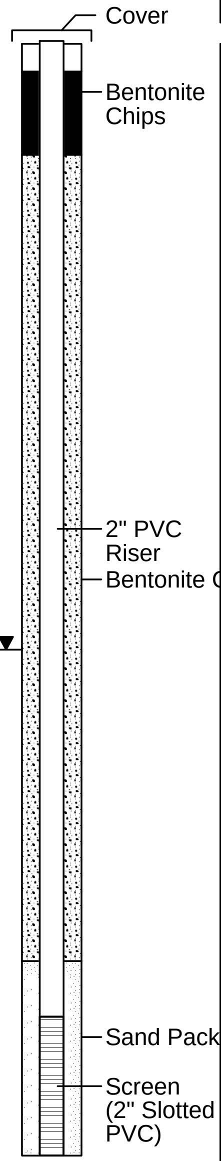
Lithologic Description

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)
0–2	CL	Dry, brown (10YR 5/4) soft SILTY CLAY with some fine gravel and roots	
2–4	CL	slightly moist below 1.5 feet	
4–6	CL	color change to dark gray (10YR 4/1) below 2.2 feet; color change to brown (7.5YR 4/3) below 4 feet; fine Sand present in matrix below 5 feet	6.0
6–8	SP	Slightly moist, dark yellowish brown (10YR 3/4), loose fine SAND, poorly graded.	8.0
8–18	SW	Dry, pale brown (10YR 6/3), loose fine to coarse SAND, well graded; trace coarse granules below 12 feet; moist below 14 feet	
18–23.1	SW	color change to yellowish brown (10YR 5/8) below 18 feet; wet below 21 feet	23.1
23.1–29.5	SP	Wet, gray (10YR 5/1), loose, fine SAND, poorly graded.	29.5
29.5–32	ML	Wet, gray (10YR 5/1), soft, SILT, non-plastic	32.0
32–40	SW	gray (10YR 5/1), fine to medium SAND, moderately well graded, medium dense; with coarse SAND and fine GRANULES below 33.5 feet	40.0
40–42	CL	Slightly moist, dark gray (10YR 4/1), very stiff, SILTY CLAY, slightly plastic.	42.0
		End of boring at 42.0 feet	

Samples

Depth (ft)	TPV (ppm)	Recovery %	Sample Type	Blow Count
0–2	0.0	79		9/8/5/4
2–4	0.0	67		7/5/5/6
4–6	0.0	75		4/4/5/7
6–8	0.0	67		7/5/4/3
8–10	0.0	50		2/3/4/8
10–12	0.0	88		15/24/18/18
12–14	0.0	71		15/17/18/20
14–16	0.0	75		13/15/19/20
16–18	0.0	75		19/18/16/15
18–20	0.0	75	S	5/8/8/10
20–22	0.0	88		9/12/14/11
22–24	0.0	75		7/6/6/6
24–26	0.0	88		2/3/4/5
26–28	0.0	88		3/5/6/7
28–30	0.0	100		4/5/10/13
30–32	0.0	100		9/12/17/21
32–34	0.0	100		5/9/15/21
34–36	1.7	100		9/10/16/21
36–38	5.7	100	S	9/11/17/18
38–40	4.7	100		11/22/18/16
40–42	0.0	88	S	9/12/17/19

Well: MMW-C-16D
Elev.:



Remarks

Encountered sand heaving into drill stem at depth. Added total of 60 gallons water to control heaving.

Sampled 18-20, 36-38 and 40-42 ft intervals.

Monitoring well installed after completion of boring.

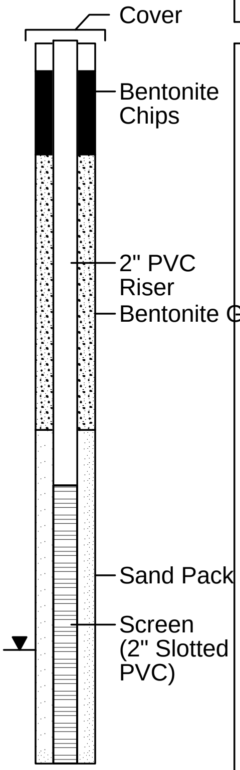
S=Soil
TPV = Total Photo-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

09-16-2012 T:\2001\M01046 Michigan Meadows Apts\Data\Boring Logs\MMW-C-16D.bor

BORING NUMBER:MMW-C-16S

CLIENT: AMMH	FIELD GEOLOGIST:Mark Breting
PROJECT LOCATION: Indianapolis, IN	COORDINATES:
PROJECT NAME: Michigan Plaza	DRILLING DATE:6/5/2012
PROJECT NUMBER: M01046	DRILLING METHOD:HSA/Split Spoon
DRILLING CONTRACTOR:ATC Assoc. Inc.	DRILLING EQUIPMENT:Dietrich D-50
DRILLER: Warren Bates	GW DEPTH (OBSERVED):22 ft-bgs
BORING LOCATION:Floral Park Cemetery	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Type	Blow Count	Well: MMW-C-16S Elev.:	Remarks
0–27			Blank Drill to 27 feet	27.0						Boring offset four feet north from MMW-C-16D; Monitoring well installed after completion of boring.
27			End of boring at 27.0 feet							



S=Soil
TPV = Total Photo-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

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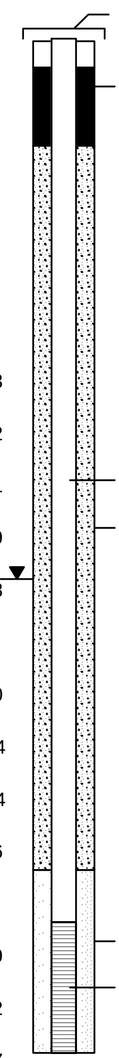
BORING NUMBER: MMW-C-17D

CLIENT: AMMH	FIELD GEOLOGIST: Mark Breting
PROJECT LOCATION: Indianapolis, IN	COORDINATES:
PROJECT NAME: Michigan Plaza	DRILLING DATE: 6/5/2012
PROJECT NUMBER: M01046	DRILLING METHOD: HSA/Split Spoon
DRILLING CONTRACTOR: ATC Assoc. Inc.	DRILLING EQUIPMENT: Dietrich D-50
DRILLER: Warren Bates	GW DEPTH (OBSERVED): 21 ft-bgs
BORING LOCATION: Floral Park Cemetery	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)
0–0.3		Top Soil	0.3
0.3–5	CL	Slightly moist, very dark grayish brown (10YR 3/2), soft, SANDY CLAY with some granules and cobbles	5.0
5–8	SP	Slightly moist, pale brown (10YR 6/3), loose fine to medium SAND with trace fine granules, rounded	
8–10.5	SP	color change to strong brown (7.5YR 5/8), some coarse granules below 8.3 feet	
10.5–14	SP	color change to dark grayish brown (10YR 4/2), fine to medium SAND, with trace fine granules below 10.8 feet	
14–20	SP	some fine to coarse granules, subangular to angular, below 12.9 feet color change to strong brown (7.5YR 5/8) below 14.2 feet 0.2 feet of CLAYEY SAND below 18.4 feet moist below 19 feet	20
20–35.2	SW	Moist, dark grayish brown (10YR 4/2), dense, fine to medium SAND (SP), moderately well-graded, non-plastic wet below 21 feet color change to dark gray below 25.5 feet, increasing silt content 0.2 foot cobble zone (limestone and ultramafic granules) below 26 feet	35.2
35.2–38.8	SW	Wet, gray (10YR 5/1), alternating lenses of fine SAND to fine to coarse SAND, dense	38.8
38.8–40	CL	Slightly moist, dark gray (10YR 4/1), very stiff SILTY CLAY 0.4 ft of SILT below 39.1 feet End of boring at 40.0 feet	40.0

Depth BGS (ft)	TPV (ppm)	Recovery %	Sample Type	Blow Count
0–2	0.0	100		
2–4	0.0	100		
4–6	0.0	75		5/7/8/9
6–8	0.0	67		7/10/12/14
8–10	0.0	67		9/9/10/10
10–12	0.0	75		13/10/9/11
12–14	0.0	75		13/16/14/13
14–16	0.0	79		12/10/12/12
16–18	0.0	79		11/15/20/21
18–20	0.0	79	S	17/23/17/19
20–22	0.0	79		17/17/18/18
22–24	0.0	88		8/8/21/24
24–26	0.0	88		11/17/21/20
26–28	0.0	54		20/30/50/0.4
28–30	0.0	58		13/35/50/0.4
30–32	0.0	79		35/42/32/36
32–34	0.0	100		9/21/36/48
34–36	0.0	100		26/22/21/29
36–38	0.0	100		17/26/41/42
38–40	0.0	100	S	11/20/25/27

Well: MMW-C-17D
Elev.:



Remarks

Hand auger to 4 ft-bgs to clear utilities.

Encountered sand heaving into drill stem below 30 ft. Added total of 50 gallons water to control heaving.

Sampled 18-20 and 38-38.8 ft intervals.

Monitoring well installed after completion of boring.

S=Soil
TPV = Total Photo-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

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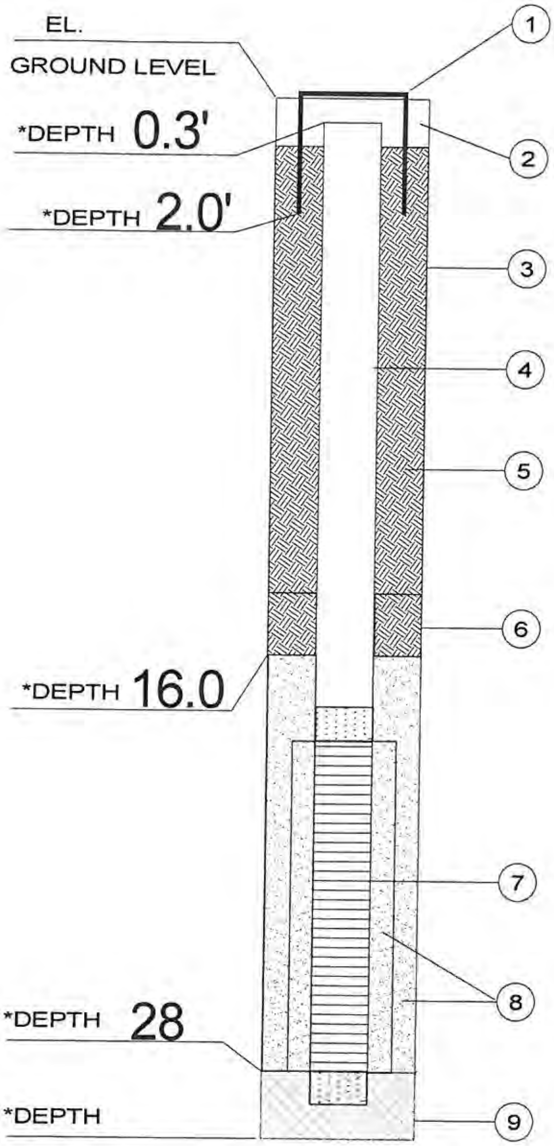
WELL CONSTRUCTION DIAGRAM

WELL NO. MMW-P-01



1. PROTECTIVE CASING I.D. 8/12 INCHES
2. SURFACE SEAL TYPE Concrete
3. BOREHOLE DIAMETER 8.25 INCHES
4. RISER PIPE:
   - a. Type PVC
   - b. I.D. 2.0 INCHES
   - c. Length 17.75 FEET
   - d. Joint Type Threaded
5. BACKFILL:
   - a. Type Bentonite Grout
   - b. Installation HSA - Pumped in
6. TYPE OF SEAL Bentonite Grout
7. SCREEN:
   - a. Type PVC (UPACK)
   - b. I.D. 2.0 inner, 3.5 outer INCHES
   - c. Slot Size 0.01 INCHES
   - d. Length 9.5 screen, 10 total FEET
8. SCREEN FILTER TYPE #5 Sand
9. BACKFILL TYPE

*DEPTH IN FEET BELOW GROUND LEVEL

DATE COMPLETED 9/28/05

DEVELOPMENT METHOD Geosquirt, Double Barrel, Purge Pump

DRILLING CONTRACTOR Midway Services, Inc

GEOLOGIST/FIELD SCIENTIST
Leena Lothe/Chris Jaros/Megan Hill

DRILLER JR Todish

RIG TYPE Hollow Stem Auger BK 51 Heavy Duty

WELL CONSTRUCTION DIAGRAM

Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana

Project Number: M01046	
Drawing File: MMW-P-01.skf	
Date Prepared: 10/10/05	
Scale: Not to Scale	
Drn. By:	Ckd. By:	Approved By:

MUNDELL & ASSOCIATES, INC.
429 East Vermont Street, Suite 200
Indianapolis, Indiana 46202-3688

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-01 MMW-P-01

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Rick Davis
BORING LOCATION: Center of Michigan Plaza
FIELD GEOLOGIST: Leena Lothe & Jason Armour
NOTES: SL sample:GP-01-15.5'; 2 GW samples: GP-01-21' & GP-01-30'

DATE BEGAN: 08/18/04
DATE FINISHED: 08/18/04
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 19.0'
DEPTH OF BORING: 30.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)
ASPHALT: About 3 inches of ASPHALT		0.2
CRUSHED LIMESTONE: CRUSHED LIMESTONE, light olive brown (2.5 Y 5/6), dry, no odor		0.2
SAND: Fine to medium SAND with trace to some gravel - potential fill, light olive brown (2.5 Y 5/6), dry, no odor	SW	2.6
CL: SILTY CLAY with trace to some sand, dark olive brown (2.5 Y 3/3), dry, slightly organic odor - slightly organic odor observed from about 4.5' to 5.0'	CL	3.5
SW: MEDIUM TO COARSE SAND with trace to some fine to medium gravel, light yellowish brown (2.5 Y 6/4), dry, no odor	SW	6.0
SP: FINE TO MEDIUM SAND with trace coarse sand and fine gravel, light yellowish brown (2.5 Y 6/4), dry, no odor	SP	10.0
SW: MEDIUM TO COARSE SAND with trace to some fine to medium gravel, color changes back to light yellowish brown (2.5 Y 6/4), dry, no odor - color change to dark yellowish brown (10 YR 4/6) beyond 11' - color changes back to yellowish brown (2.5 Y 6/4) beyond 14.5'	SW	11.0
SP: FINE TO MEDIUM SAND with trace silt and fine gravel, light yellowish brown (2.5 Y 6/4), dry - wet, no odor	SP	18.5
ML: SILT with trace sand and trace fine gravel, dark gray (2.5 Y 4/1), wet, no odor	ML	19.75
SW: MEDIUM TO COARSE SAND with trace to some fine to medium gravel, gray (2.5 Y 5/1), dry - wet, no odor		20.0

Depth (feet)	PID Headspace (ppm)	Rec. %
0.0–1.0	5.1	70%
1.0–2.0	5.3	
2.0–3.0	7.8	
3.0–4.0	7.9	
4.0–5.0	NA	75%
5.0–6.0	6.6	
6.0–7.0	7.0	
7.0–8.0	7.8	
8.0–9.0	NA	60%
9.0–10.0	8.1	
10.0–11.0	7.8	
11.0–12.0	8.5	
12.0–13.0	NA	75%
13.0–14.0	7.1	
14.0–15.0	8.5	
15.0–16.0	7.3	
16.0–17.0	NA	50%
17.0–18.0	NA	
18.0–19.0	8.3	
19.0–20.0	9.5	
20.0–21.0	NA	
21.0–22.0	NA	
22.0–23.0	11.5	

Depth scale: 0.0, 5.0, 10.0, 15.0, 20.0

Well Completion Diagram

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: GP-01 MMW-P-01

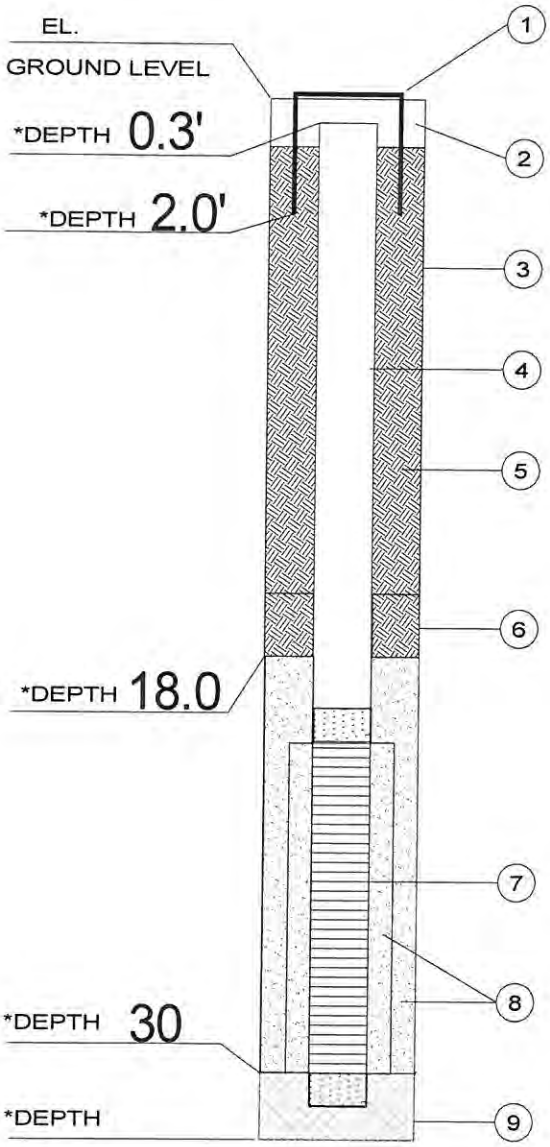
CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Rick Davis
BORING LOCATION: Center of Michigan Plaza
FIELD GEOLOGIST: Leena Lothe & Jason Armour
NOTES: SL sample:GP-01-15.5'; 2 GW samples: GP-01-21' & GP-01-30'

DATE BEGAN: 08/18/04
DATE FINISHED: 08/18/04
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 19.0'
DEPTH OF BORING: 30.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Well Completion Diagram
	SW		17.5	60%				
			30.0					
			NA				25.0	
			NA					
			17.5					
			21.9	55%				
- End of the Boring at 30'			31.1				30.0	

WELL CONSTRUCTION DIAGRAM

WELL NO. MMW-P-02



*DEPTH IN FEET BELOW GROUND LEVEL

1. PROTECTIVE CASING I.D. 8/12 INCHES
2. SURFACE SEAL TYPE Concrete
3. BOREHOLE DIAMETER 8.25 INCHES
4. RISER PIPE:
   a. Type PVC
   b. I.D. 2.0 INCHES
   c. Length 19.75 FEET
   d. Joint Type Threaded
5. BACKFILL:
   a. Type Bentonite Grout
   b. Installation HSA - Pumped in
6. TYPE OF SEAL Bentonite Grout
7. SCREEN:
   a. Type PVC (UPACK)
   b. I.D. 2.0 inner, 3.5 outer INCHES
   c. Slot Size 0.01 INCHES
   d. Length 9.5 screen, 10 total FEET
8. SCREEN FILTER TYPE #5 Sand
9. BACKFILL TYPE ______

DATE COMPLETED 9/27/05

DEVELOPMENT METHOD Geosquirt, Double Barrel, Purge Pump

DRILLING CONTRACTOR Midway Services, Inc

DRILLER JR Todish

RIG TYPE Hollow Stem Auger BK 51 Heavy Duty

GEOLOGIST/FIELD SCIENTIST
Leena Lothe/Chris Jaros/Megan Hill

WELL CONSTRUCTION DIAGRAM Michigan Plaza 3801-3823 West Michigan Street Indianapolis, Indiana	Project Number: M01046 Drawing File: MMW-P-02.skf Date Prepared: 10/10/05 Scale: Not to Scale Drn. By: | Ckd. By: | Approved By:	MUNDELL & ASSOCIATES, INC. 429 East Vermont Street, Suite 200 Indianapolis, Indiana 46202-3688

Boring/Well ID: MMW-P-02-A

Mundell Consulting Professionals for the Earth and the Environment

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/7/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/7/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 20 ft
BORING LOCATION:	SURFACE ELEVATION: NS

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments
0			Asphalt	0.5				
1			Confirm lithology to 4.0'					
4			Blank drill 4.0 to 8.0 ft					
8	SW		Fine to medium grained SAND, light yellowish brown (10YR 6/4), slightly moist, medium dense, non-plastic	8.0	0.7	60		
10–12					0.1			
12	SW		Fine to coarse grained SAND with some fine to coarse GRANULES, yellowish brown (10YR 5/4), slightly moist, trace clay content, medium dense	12.0	1.35	52.5	S	12-14'
14–16					0.55			
16–18					0.3	62.5		
18–20					6.15			
20			Wet below 20.0'		13.9	77.5	S	20-22' (DUP-1)
22–24					0.95			
24								

MMW-P-02-A

2" Dia. Borehole

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

NR = Not Recorded

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Boring/Well ID: MMW-P-02-A

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/7/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/7/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 20 ft
BORING LOCATION:	SURFACE ELEVATION: NS

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	MMW-P-02-A
24				24					
25	SW-GW		Fine to coarse grained SAND and fine to coarse GRANULES, gray (10YR 5/1), granules angular to subrounded, wet, loose, non-plastic		1.95	97.5			
26–28			Fine grained SAND below 26.7 ft		1.2				2" Dia. Borehole
29–30					0.8	87.5			
31–32	SP		Fine grained SAND with trace granules, dark grayish brown (10YR 4/2), wet, medium dense Fine to medium grained sand below 31.1 ft	30.5	0.7				

End of boring at 32.0'

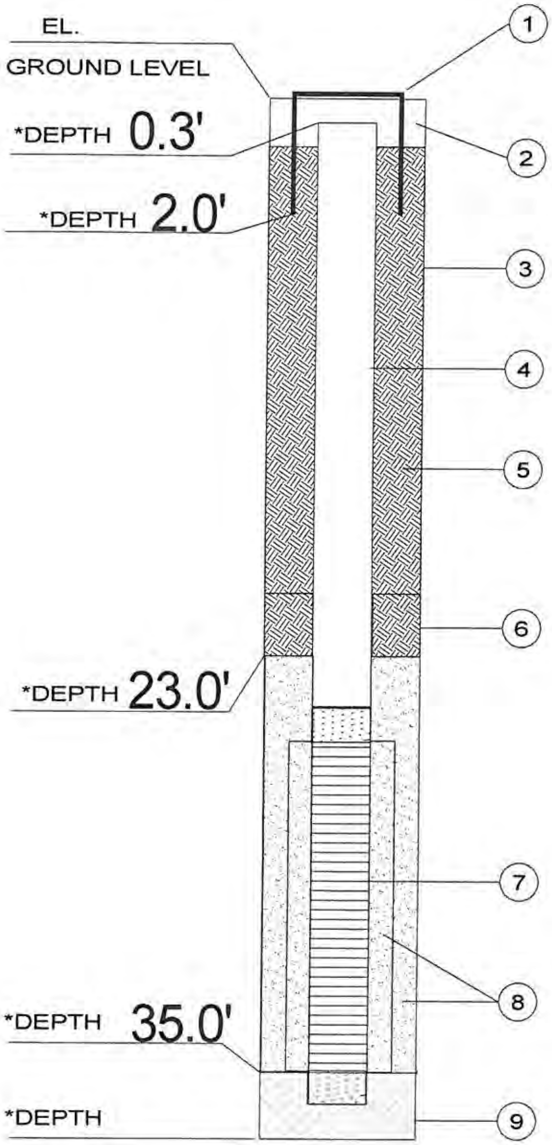
Depth scale: 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

NR = Not Recorded

WELL CONSTRUCTION DIAGRAM

WELL NO. MMW-P-03D



*DEPTH IN FEET BELOW GROUND LEVEL

1. PROTECTIVE CASING I.D. 8/12 INCHES
2. SURFACE SEAL TYPE Concrete
3. BOREHOLE DIAMETER 8.25 INCHES
4. RISER PIPE:
   a. Type PVC
   b. I.D. 2.0 INCHES
   c. Length 24.75 FEET
   d. Joint Type Threaded
5. BACKFILL:
   a. Type Bentonite Grout
   b. Installation HSA- Pumped in
6. TYPE OF SEAL Bentonite Grout
7. SCREEN:
   a. Type PVC (UPACK)
   b. I.D. 2.0 inner, 3.5 outer INCHES
   c. Slot Size 0.01 INCHES
   d. Length 9.5 screen, 10 total FEET
8. SCREEN FILTER TYPE #5 Sand
9. BACKFILL TYPE

DATE COMPLETED 9/27/05

DEVELOPMENT METHOD Geosquirt, Double Barrel, Purge Pump

DRILLING CONTRACTOR Midway Services, Inc

DRILLER JR Todish

RIG TYPE Hollow Stem Auger BK 51 Heavy Duty

GEOLOGIST/FIELD SCIENTIST
Leena Lothe/Chris Jaros/Megan Hill

WELL CONSTRUCTION DIAGRAM

Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana

Project Number: M01046	
Drawing File: MMW-P-03D.skf	
Date Prepared: 10/11/05	
Scale: Not to Scale	
Drn. By:	Ckd. By:	Approved By:

MUNDELL & ASSOCIATES, INC.
429 East Vermont Street, Suite 200
Indianapolis, Indiana 46202-3688

Boring/Well ID: MMW-P-03D-A

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/7/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/7/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 28 ft
BORING LOCATION:	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments
0	FB		Asphalt					
1–4	CL		SILTY CLAY, dark gray, slightly moist (confirmed lithology to original soil boring)	4.0				
4–24			Blank Drill 4 ft to 28 ft					

MMW-P-03D-A

2" Dia. Borehole

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

NR = Not Recorded

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Boring/Well ID: MMW-P-03D-A

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/7/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/7/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 28 ft
BORING LOCATION:	SURFACE ELEVATION: NS

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments
24–28								
28–32	SW		fine to medium SAND, gray (10YR 5/1), wet, medium dense	28.0	0.45 (28–30); 0.4 (30–32)	88		
32–36			fine to coarse SAND and fine to coarse GRANULES, gray (10YR 5/1), wet, loose, non-plastic, with trace cobbles	32.0	0.6 (32–34); 0.65 (34–36)	100		
36–39.5	SW		fine to coarse SAND, gray (10YR 5/1), wet, loose, non-plastic with coarse granules below 38.5 ft	36.0	0.85 (36–38); 0.5 (38–40)	100	S	38-40'
39.5–40	CL		SILTY CLAY, gray (10YR 5/1), dry-slightly moist, hard, slightly plastic	39.5 / 40.0				

End of boring at 40 ft

MMW-P-03D-A

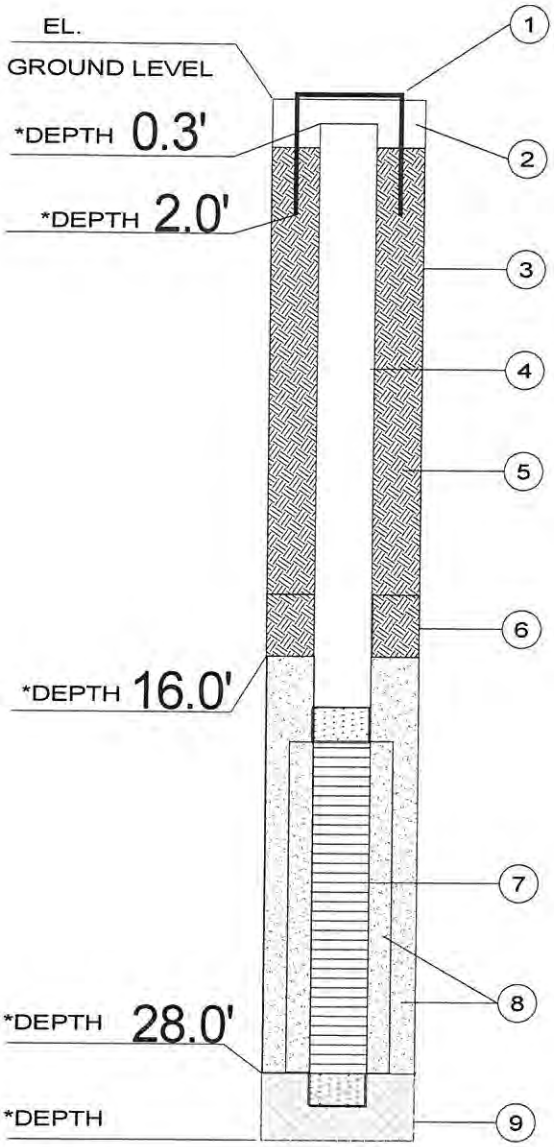
2" Dia. Borehole

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

NR = Not Recorded

WELL CONSTRUCTION DIAGRAM

WELL NO. MMW-P-03S



*DEPTH IN FEET BELOW GROUND LEVEL

1. PROTECTIVE CASING I.D. 8/12 INCHES
2. SURFACE SEAL TYPE Concrete
3. BOREHOLE DIAMETER 8.25 INCHES
4. RISER PIPE:
   a. Type PVC
   b. I.D. 2.0 INCHES
   c. Length 18 FEET
   d. Joint Type Threaded
5. BACKFILL:
   a. Type Bentonite Grout
   b. Installation HSA - Pumped in
6. TYPE OF SEAL Bentonite Grout
7. SCREEN:
   a. Type PVC (UPACK)
   b. I.D. 2.0 inner, 3.5 outer INCHES
   c. Slot Size 0.01 INCHES
   d. Length 9.5 screen, 10 total FEET
8. SCREEN FILTER TYPE #5 Sand
9. BACKFILL TYPE

DATE COMPLETED 9/26/05

DEVELOPMENT METHOD Geosquirt, Double Barrel, Purge Pump

DRILLING CONTRACTOR Midway Services, Inc

DRILLER JR Todish

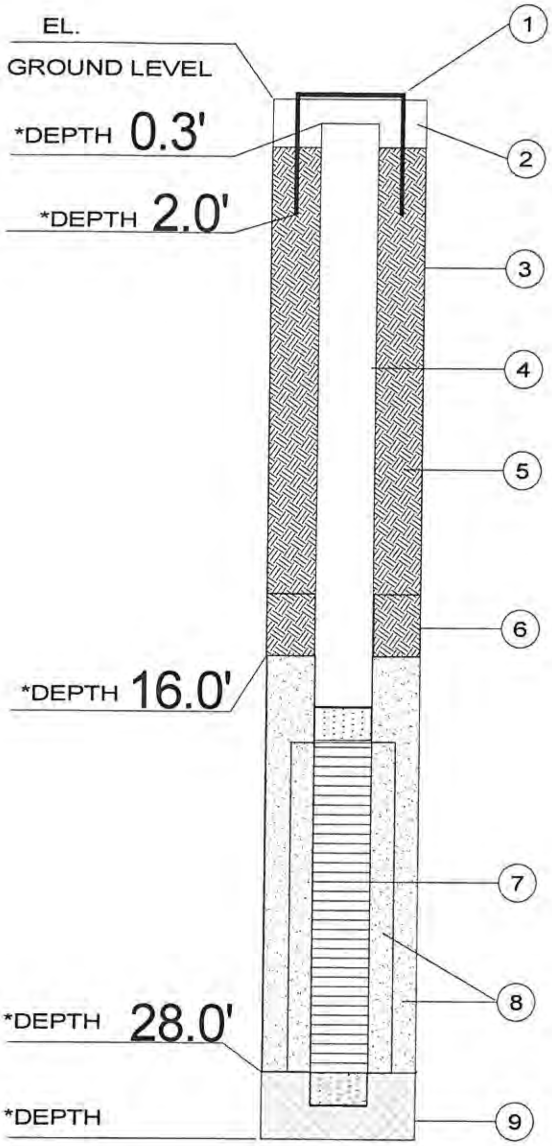
RIG TYPE Hollow Stem Auger BK 51 Heavy Duty

GEOLOGIST/FIELD SCIENTIST
Leena Lothe/Chris Jaros/Megan Hill

WELL CONSTRUCTION DIAGRAM Michigan Plaza 3801-3823 West Michigan Street Indianapolis, Indiana	Project Number: M01046 Drawing File: MMW-P-03S.skf Date Prepared: 10/10/05 Scale: Not to Scale Drn. By: Ckd. By: Approved By:	MUNDELL & ASSOCIATES, INC. 429 East Vermont Street, Suite 200 Indianapolis, Indiana 46202-3688

WELL CONSTRUCTION DIAGRAM

WELL NO. MMW-P-04



*DEPTH IN FEET BELOW GROUND LEVEL

1. PROTECTIVE CASING I.D. 8/12 INCHES
2. SURFACE SEAL TYPE Concrete
3. BOREHOLE DIAMETER 8.25 INCHES
4. RISER PIPE:
   a. Type PVC
   b. I.D. 2.0 INCHES
   c. Length 17.75 FEET
   d. Joint Type Threaded
5. BACKFILL:
   a. Type Bentonite Grout
   b. Installation HSA- Pumped in
6. TYPE OF SEAL Bentonite Grout
7. SCREEN:
   a. Type PVC (UPACK)
   b. I.D. 2.0 inner, 3.5 outer INCHES
   c. Slot Size 0.01 INCHES
   d. Length 9.5 screen, 10 total FEET
8. SCREEN FILTER TYPE #5 Sand
9. BACKFILL TYPE

DATE COMPLETED 9/26/05

DEVELOPMENT METHOD Geosquirt, Double Barrel, Purge Pump

DRILLING CONTRACTOR Midway Services, Inc

DRILLER JR Todish

RIG TYPE Hollow Stem Auger BK 51 Heavy Duty

GEOLOGIST/FIELD SCIENTIST
Leena Lothe/Chris Jaros/Megan Hill

WELL CONSTRUCTION DIAGRAM

Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana

Project Number: M01046
Drawing File: MMW-P-04.skf
Date Prepared: 10/11/05
Scale: Not to Scale
Drn. By: | Ckd. By: | Approved By:

MUNDELL & ASSOCIATES, INC.
429 East Vermont Street, Suite 200
Indianapolis, Indiana 46202-3688

Boring/Well ID: MMW-P-04-A

CLIENT: AMMH	FIELD SCIENTIST: Gabriel Hebert
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/8/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/8/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): NA
BORING LOCATION:	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	MMW-P-04-A
0	FB		Asphalt						
1	CL		CLAY	1.0					
3.5	SW		SAND	3.5					
4			Blank Drill 4 ft to 16 ft	4.0					
12									2" Dia. Borehole
16	SW		fine to medium SAND, very pale brown (10YR 7/4), with trace fine granules, slightly moist	16.0	1.6	60	S	16-18'	
19					1.1				
20			wet below 20 ft						
21	CL		SANDY CLAY, gray (10YR 6/1), slightly moist, soft	21.0	0.8	75			
22	SW		fine to coarse SAND, gray (10YR 5/1),wet, loose, with some granules	22.0	0.2				
24									

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

NR = Not Recorded

03-12-2013 T:\2001\M01046 Michigan Meadows Apts\Data\Boring Logs\Miscellaneous Files\MMW-P-04-A.bor

Boring/Well ID: MMW-P-04-A

CLIENT: AMMH	FIELD SCIENTIST: Gabriel Hebert
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/8/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/8/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): NA
BORING LOCATION:	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	MMW-P-04-A
24									
25					0.3				
26						100			
27					0.5				
28	SW								2" Dia. Borehole
29					0.15				
30						100			
31					0.25				
32				32.0					

End of Boring at 32 ft

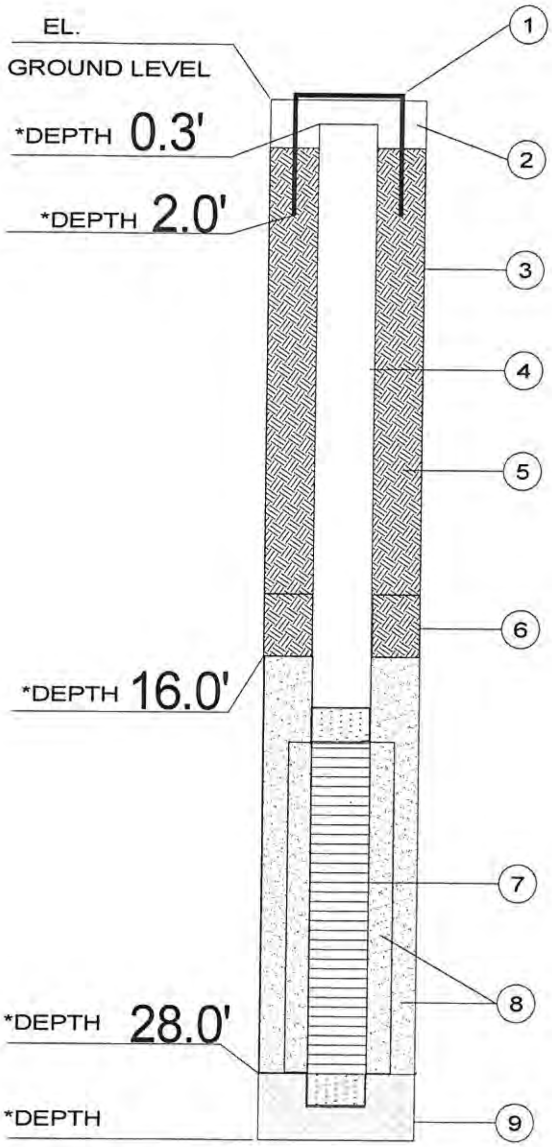
Depth scale continues: 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

NR = Not Recorded

WELL CONSTRUCTION DIAGRAM

WELL NO. MMW-P-05



*DEPTH IN FEET BELOW GROUND LEVEL

1. PROTECTIVE CASING I.D. 8/12 INCHES
2. SURFACE SEAL TYPE Concrete
3. BOREHOLE DIAMETER 8.25 INCHES
4. RISER PIPE:
   a. Type PVC
   b. I.D. 2.0 INCHES
   c. Length 17.75 FEET
   d. Joint Type Threaded
5. BACKFILL:
   a. Type Bentonite Grout
   b. Installation HSA - Pumped in
6. TYPE OF SEAL Bentonite Grout
7. SCREEN:
   a. Type PVC (UPACK)
   b. I.D. 2.0 inner, 3.5 outer INCHES
   c. Slot Size 0.01 INCHES
   d. Length 9.5 screen, 10 total FEET
8. SCREEN FILTER TYPE #5 Sand
9. BACKFILL TYPE

DATE COMPLETED 9/26/05

DEVELOPMENT METHOD Geosquirt, Double Barrel, Purge Pump

DRILLING CONTRACTOR Midway Services, Inc

DRILLER JR Todish

RIG TYPE Hollow Stem Auger BK 51 Heavy Duty

GEOLOGIST/FIELD SCIENTIST
Leena Lothe/Chris Jaros/Megan Hill

WELL CONSTRUCTION DIAGRAM

Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana

Project Number: M01046

Drawing File: MMW-P-05.skf

Date Prepared: 10/11/05

Scale: Not to Scale

Drn. By: | Ckd. By: | Approved By:

MUNDELL & ASSOCIATES, INC.
429 East Vermont Street, Suite 200
Indianapolis, Indiana 46202-3688

MUNDELL & ASSOCIATES, INC.
BORING LOG

SOIL BORING NO: GP-05
MW NO:

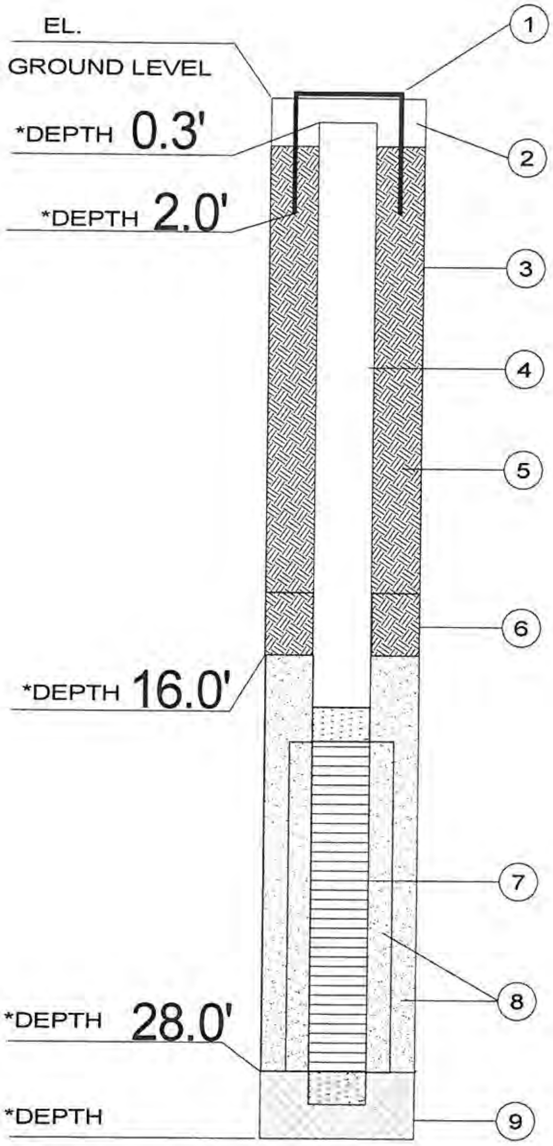
CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: American Drilling Services
DRILLER: Rick Davis
BORING LOCATION: East side of plaza parking lot
FIELD GEOLOGIST: Leena Lothe & Jason Armour
NOTES: SS:GP-05 (17'); 1 GW sample:GP-05-22'

DATE BEGAN: 08/18/04
DATE FINISHED: 08/18/04
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 19'
DEPTH OF BORING: 22.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Well Construction Diagram
ASPHALT: About 3 inches of ASPHALT							0.0	
FILL: FILL medium sand with some clay, first four inches BASE COURSE followed by yellowish brown (10 YR 4/4) fill material, slight moist, no odor		0.25	5.4					
			4.5					
CL: SILTY CLAY with trace to some sand, trace fine gravel and coarse sand, very dark gray (10 YR 3/1), trace roots and natural wood fragments, slightly moist, slight organic odor	CL	2.0	3.4	90%				
			3.8					
			3.3					
- color change to dark yellowish brown (10 YR 3/4) at 3' with some sand, no odor			3.9				5.0	
- grading to some coarse and medium sand with trace to some fine to medium gravel beyond 4'			3.9	80%				
SW: MEDIUM TO COARSE SAND with trace to some fine to medium gravel, dark yellowish brown (10 YR 4/4), dry, no odor	SW	7.0	3.8					
			3.9					
			4.0					
			5.0	90%			10.0	
			3.6					
			6.7					
- color change to yellowish brown (10 YR 5/8) at 10-11'			5.6					
			6.0	90%				
SP: FINE SAND with trace coarse sand, trace to some fine gravel, light olive brown (2.5 Y 5/4), dry, no odor	SP	15.0	5.2				15.0	
			6.8					
			9.9					
- soil becomes slightly moist at 18'			4.7	50%				
			4.8					
ML: SILT with trace fine sand, gray (2.5 Y 5/1), no odor	ML	19.5						
		20.0					20.0	
- blind drilled								
- End of the Boring at 22'								

WELL CONSTRUCTION DIAGRAM

WELL NO. MMW-P-06



*DEPTH IN FEET BELOW GROUND LEVEL

1. PROTECTIVE CASING I.D. 8/12 INCHES
2. SURFACE SEAL TYPE Concrete
3. BOREHOLE DIAMETER 8.25 INCHES
4. RISER PIPE:
   - a. Type PVC
   - b. I.D. 2.0 INCHES
   - c. Length 17.75 FEET
   - d. Joint Type Threaded
5. BACKFILL:
   - a. Type Bentonite Grout
   - b. Installation HSA - Pumped in
6. TYPE OF SEAL Bentonite Grout
7. SCREEN:
   - a. Type PVC (UPACK)
   - b. I.D. 2.0 inner, 3.5 outer INCHES
   - c. Slot Size 0.01 INCHES
   - d. Length 9.5 screen, 10 total FEET
8. SCREEN FILTER TYPE #5 Sand
9. BACKFILL TYPE

DATE COMPLETED 9/28/05

DEVELOPMENT METHOD Geosquirt, Double Barrel, Purge Pump

DRILLING CONTRACTOR Midway Services, Inc

GEOLOGIST/FIELD SCIENTIST
Leena Lothe/Chris Jaros/Megan Hill

DRILLER JR Todish

RIG TYPE Hollow Stem Auger BK 51 Heavy Duty

WELL CONSTRUCTION DIAGRAM Michigan Plaza 3801-3823 West Michigan Street Indianapolis, Indiana	Project Number: M01046 Drawing File: MMW-P-06.skf Date Prepared: 10/11/05 Scale: Not to Scale Drn. By: | Ckd. By: | Approved By:	MUNDELL & ASSOCIATES, INC. 429 East Vermont Street, Suite 200 Indianapolis, Indiana 46202-3688

MUNDELL & ASSOCIATES, INC.
BORING LOG

BORING NO: MMW-P-06

PAGE 1 OF 1

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Plaza
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: JR Todish
BORING LOCATION: Plaza parking lot, in front of mexican grocery store
FIELD GEOLOGIST: Leena Lothe/Chris Jaros/Megan Hill
NOTES: UPACK Screen used (packed with #5 sand before installation)

DATE BEGAN: 09/26/05
DATE FINISHED: 09/28/05
DRILLING METHOD: HSA with 4' Geoprobe Sampler
DRILL EQUIP: Geoprobe 5410, HSA
GW DEPTH (OBSERVED): 20'
DEPTH OF BORING: 33'
TOP OF CASING ELEVATION:
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	Lithology	Stratum Depth (feet)	Sample Collection Interval	Depth (meters)	Depth (feet)	Well Completion Diagram
ASPHALT: Approximately 3" asphalt				0	0.0	Casing and Concrete
FILL: GRAVEL approximatedly 5-6", base course		0.25				
SW: FINE TO MEDIUM SAND, (10 YR 4/4), dry, no odor		0.75				Bentonite Grout
CL: SILTY CLAY, very dark gray (10 YR 3/1), dry to slightly moist, no odor	CL	3			5.0	Riser
SW: FINE TO COARSE SAND with trace to some fine gravel, dark brown (7.5 YR 4/3), dry, no odor	SW	8	GP-06 (9-10')		10.0	
SP: FINE TO MEDIUM SAND with trace silt, light yellow-brown (2.5 Y 6/4), dry, no odor	SP	11				
SW: MEDIUM TO COARSE SAND with trace gravel, dry, no odor	SW	13	GP-06 (13-14')	5	15.0	Sand Pack; UPACK Screen
- silty sand @ 20', (2.5 Y 6/4), moist, no odor					20.0	Water Level on 9/26/05

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-P-07

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: East side of plaza parking lot
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 3 GW samples: MMW-P-07 (20'), (30'), (40'); SS: 19-20'

DATE BEGAN: 1/11/07
DATE FINISHED: 1/11/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 19'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
ASPHALT: 3 - 4" of ASPHALT		0.25	0.0	100%			0.0	
FILL: 5 - 6" of FILL gravel, BASE COURSE		1.0	0.0					
SW: FINE TO MEDIUM SAND, yellowish brown (10 YR 4/4), dry, no odor	SW		0.0					
CL: SILTY CLAY with trace to some sand, trace fine gravel and coarse sand, very dark gray (10 YR 3/1), dry, no odor	CL	3.0	0.0, 0.0, 0.0	75%			5.0	
SW: FINE TO COARSE SAND with trace to some fine to medium gravel, dark yellowish brown (10 YR 4/4), dry, no odor	SW	6.0	0.0					
SP: FINE TO MEDIUM SAND with trace silt, light olive brown (2.5 Y 5/4), dry, no odor	SP	7.0	0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0	60%			10.0	
SW: MEDIUM TO COARSE SAND with trace gravel, dry, no odor	SW	14.0	0.0, 0.0, 0.0, 0.0, 0.0, 0.0	60%, 75%	✱ (19'), ✱ (20')		15.0	▼ (19')
- blind drilled below 20 feet		20.0					20.0, 25.0	
- Well set at 28'					✱ (30')		30.0, 35.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-P-07

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: East side of plaza parking lot
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 3 GW samples: MMW-P-07 (20'), (30'), (40'); SS: 19-20'

DATE BEGAN: 1/11/07
DATE FINISHED: 1/11/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 19'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
- End of Boring at 40'					✱		40.0	

Boring/Well ID: MMW-P-07-A

CLIENT: AMMH	FIELD SCIENTIST: Gabriel Hebert
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/8/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/8/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 19 ft
BORING LOCATION:	SURFACE ELEVATION: NS

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments
0–1	FB	FILL	1.0				
1–3	SW	SAND	3.0				
3–4	CL	SILTY CLAY	4.0				
4–16		Blank Drill 4 ft to 16 ft	16.0				
16–22	SW	fine to medium SAND, pale brown (10YR 6/3), moist; wet below 19 ft	22.0	0.9 (16–18); 4.9 (18–20); 7.6 (20–22)	75 (16–20); 75 (20–24)	S (21)	20-22'
22–24		fine to coarse SAND and fine to coarse GRANULES, gray (10YR 5/1), wet, loose		0.6 (22–24)			

MMW-P-07A

2" Dia. Borehole

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

NR = Not Recorded

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Boring/Well ID:	**MMW-P-07-A**
CLIENT: AMMH	FIELD SCIENTIST: Gabriel Hebert
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/8/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/8/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 19 ft
BORING LOCATION:	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	MMW-P-07A
24									
25					0.4				
26						75			
27					0.55				
28									2" Dia. Borehole
29					0.85				
30			less granules between 30 and 32 ft			75			
31					0.8				
32			End of Boring 32 ft	32.0					
33									
34									
35									
36									
37									
38									
39									
40									
41									
42									
43									
44									
45									
46									
47									
48									

REMARKS:
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USCS = Unified Soil Classification System
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NS = Not Surveyed

NR = Not Recorded

MUNDELL & ASSOCIATES, INC.
BORING LOG

BORING NO: MMW-P-08

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: East side of plaza parking lot
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 3 GW samples: MMW-P-08 (20'), (30'), (40'); SS: 19-20'

DATE BEGAN: 1/11/07
DATE FINISHED: 1/11/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 19'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
ASPHALT: 3 - 4" of ASPHALT		0.25	0.1				0.0	
FILL: 5 - 6" of FILL gravel, BASE COURSE		1.0	0.1					
SW: FINE TO MEDIUM SAND, yellowish brown (10 YR 4/4), dry, no odor	SW		0.1					
CL: SILTY CLAY with trace to some sand, trace fine gravel and coarse sand, very dark gray (10 YR 3/1), dry, no odor	CL	3.0	0.1, 0.1, 0.1				5.0	
SW: FINE TO COARSE SAND with trace to some fine to medium gravel, dark yellowish brown (10 YR 4/4), dry, no odor	SW	6.0	0.1					
SP: FINE TO MEDIUM SAND with trace silt, light olive brown (2.5 Y 5/4), dry, no odor	SP	7.0	0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1				10.0	
SW: MEDIUM TO COARSE SAND with trace gravel, dry, no odor	SW	14.0	0.1, 0.1, 0.1, 0.1, 0.1, 60.0		✱ (19), ✱ (20)		15.0	▼ (19)
- blind drilled below 20 feet		20.0					20.0, 25.0	
- Well set at 28'					✱ (30)		30.0, 35.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-P-08

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: East side of plaza parking lot
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 3 GW samples: MMW-P-08 (20'), (30'), (40'); SS: 19-20'

DATE BEGAN: 1/11/07
DATE FINISHED: 1/11/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 19'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
- End of Boring at 40'					✷		40.0	

Boring/Well ID: MMW-P-08-A

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 7/19/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 7/19/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: Midway Svcs	DRILLING EQUIPMENT: 6620 DT
DRILLER: JR Todish	GW DEPTH (OBSERVED): 18
BORING LOCATION: 3 ft east of MMW-P-08	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments
0			Blank Drill ground surface ft to 18 ft					
2								Hand auger to 4 feet to clear utilities
18	SP		Fine-coarse SAND, brown (10TR 5/3), wet, loose, with trace fine granules	18.0				
19					2.5	75		
20			medium dense below 20 feet					
21			increased clay content below 21 feet		6.5			
22						50		
23					NR			
24			SAND and GRANULES (larger granules preventing recovery)	24.0	NR	0		

Depth scale: 0–25 ft

MMW-P-08-A

2" Dia. Borehole

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed
NR = Not Recorded

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Boring/Well ID: MMW-P-08-A

Mundell Consulting Professionals for the Earth and the Environment

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 7/19/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 7/19/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: Midway Svcs	DRILLING EQUIPMENT: 6620 DT
DRILLER: JR Todish	GW DEPTH (OBSERVED): 18
BORING LOCATION: 3 ft east of MMW-P-08	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	MMW-P-08-A
25–28					NR	0		Large cobble zone between 24-36' unable to contain samples in tube	
28–32					NR	1		Insufficient recovery to field screen 28-32' interval	2" Dia. Borehole
32–36					NR	0			
36–38	CL		SILTY CLAY, dark gray (10YR 5/1), slightly moist, very stiff	36.1	0.0	65			
38–40				40.0	0.0				

End of boring at 40 ft

Depth scale: 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed
NR = Not Recorded

MUNDELL & ASSOCIATES, INC.

BORING LOG **BORING NO:** MMW-P-9D

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: NW corner of intersection of Olin Ave. and Cossell Rd.
FIELD GEOLOGIST: April Nelson & Megan Hill
NOTES:

DATE BEGAN: 5/31/07
DATE FINISHED: 5/31/07
DRILLING METHOD: Direct Push / HSA
DRILL EQUIP: Geoprobe 5400 / BK 51 HD
GW DEPTH (OBSERVED): 20'
DEPTH OF BORING: 45'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
TOPSOIL: with Grass and roots, very dk grayish-brown (10 YR 3/2)			0.1 3.1	55%			0.0	
CL: SILTY CLAY with trace gravel, dry, dark brown (10 YR 3/3)	CL	3.0	NR 2.5	40%			5.0	
SW: FINE TO MEDIUM SAND with trace gravel, slightly moist, brown (10 YR 4/3)	SW	7.0	2.7 5.5	75%			10.0	
SW: COURSE SAND with gravel, slightly moist, brown (10 YR 4/3)	SW	11.0	0.1 0.1	60%				
SW: FINE TO MEDIUM SAND with trace silt and gravel, slightly moist, brown (10 YR 4/3) - 1" very wet sand, almost greasy @ 15'	SW	15.0	NR				15.0	
SW: COURSE SAND with trace silt and gravel, slightly moist, no odor - 3" orange color (7.5 YR 4/6) @ 18.25'	SW	18.0	0.1	50%				
SW: VERY COARSE SAND with gravel, wet, brown (10 YR 4/3)	SW	20.0	0.1	60%			20.0	▼

MUNDELL & ASSOCIATES, INC.
BORING LOG

BORING NO: MMW-P-9D

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: NW corner of intersection of Olin Ave. and Cossell Rd.
FIELD GEOLOGIST: April Nelson & Megan Hill
NOTES:

DATE BEGAN: 5/31/07
DATE FINISHED: 5/31/07
DRILLING METHOD: Direct Push / HSA
DRILL EQUIP: Geoprobe 5400 / BK 51 HD
GW DEPTH (OBSERVED): 20'
DEPTH OF BORING: 45'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
			0.1					
SW: MEDIUM TO COARSE SAND, with gravel, wet, dark gray (10 YR 4/1)	SW	23.0						
		24.0						
- Blind drilled							25.0	
							30.0	
							35.0	
							40.0	
End of boring @ 45'		45.0					45.0	

MUNDELL & ASSOCIATES, INC.
BORING LOG

BORING NO: MMW-P-9D

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: NW corner of intersection of Olin Ave. and Cossell Rd.
FIELD GEOLOGIST: April Nelson & Megan Hill
NOTES:

DATE BEGAN: 5/31/07
DATE FINISHED: 5/31/07
DRILLING METHOD: Direct Push / HSA
DRILL EQUIP: Geoprobe 5400 / BK 51 HD
GW DEPTH (OBSERVED): 20'
DEPTH OF BORING: 45'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information

Boring/Well ID: MMW-P-09-A

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 7/19/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 7/19/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: Midway Svcs	DRILLING EQUIPMENT: 6620 DT
DRILLER: JR Todish	GW DEPTH (OBSERVED): 22
BORING LOCATION: 2 feet north of well nest	SURFACE ELEVATION: NS
	SHEET 1 OF 3

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments
0			Topsoil					Hand Auger to 4 feet to clear utilities
1–4	CL		SILTY CLAY, yellowish brown (10YR 5/8), dry, stiff					
4–20			Blank probe 4 feet to 22 ft					

MMW-P-09D-A

2" Dia. Borehole

REMARKS:
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TPV = Total Photoionizable Vapors
NS = Not Surveyed

NR = Not Recorded

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Boring/Well ID: MMW-P-09-A

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 7/19/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 7/19/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: Midway Svcs	DRILLING EQUIPMENT: 6620 DT
DRILLER: JR Todish	GW DEPTH (OBSERVED): 22
BORING LOCATION: 2 feet north of well nest	SURFACE ELEVATION: NS
	SHEET 2 OF 3

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	MMW-P-09D-A
20									
21									
22	SP		fine SAND, dark grayish brown (10YR 4/2), wet, loose	22.0					▼
23					0.0				
24						38			
25					NR				
26									
27					0.0				
28			medium dense below 28 feet						
29					0.1	67			
30									2" Dia. Borehole
31					NR				
32	SW		fine to coarse SAND, dark grayish brown (10YR 4/2), wet, loose	32.0					
33			with some fine granules below 33 feet		0.5				
34						63			
35					0.2				
36									
37					0.8				
38	CL		SANDY CLAY, gray (10YR 5/1), slightly moist to moist, stiff, with some fine granules	37.8					
39					0.3				
40									

REMARKS:
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USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
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NR = Not Recorded

Boring/Well ID: MMW-P-09-A

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 7/19/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 7/19/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: Midway Svcs	DRILLING EQUIPMENT: 6620 DT
DRILLER: JR Todish	GW DEPTH (OBSERVED): 22
BORING LOCATION: 2 feet north of well nest	SURFACE ELEVATION: NS
	SHEET 3 OF 3

MMW-P-09D-A

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments
40–41.5	CL		0.2 feet of SAND and GRANULES below 40.5 feet	41.5	0.6 (40–42)	75 (40–44)		
41.5–48	SW		fine to coarse SAND, dark grayish brown (10YR 4/2), wet, loose with fine granules below 43 feet	48.0	0.8 (42–44)			
					NR (44–46)	NA (44–48)		Heaving sand trapping tooling and impeding further probing
					NR (46–48)			44-48': tube could not be retrieved but visually verified sand at base of sampler

End of Boring at 48 feet

Depth scale: 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

NR = Not Recorded

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-P-09S

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: Northwest corner of Olin Ave. and Cossell Rd. intersection
FIELD GEOLOGIST: Leena Lothe & April Nelson
NOTES: 2 GW samples: MMW-P-09 (30'), (40')

DATE BEGAN: 1/29/07
DATE FINISHED: 1/29/07
DRILLING METHOD: Direct Push
DRILL EQUIP: Geoprobe 5400
GW DEPTH (OBSERVED): 19'
DEPTH OF BORING: 40.0'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS: Same location as GP-C-03

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
							0.0	
- blind drilled								
(See Geoprobe boring GP-C-03 for soil description)								
							5.0	
							10.0	
							15.0	
								▼
							20.0	
							25.0	
Well installed at 28'								
					✱		30.0	
							35.0	

MUNDELL & ASSOCIATES, INC.
BORING LOG

BORING NO: MMW-P-09

CLIENT: AIMCO	**DATE BEGAN:** 1/29/07 — PAGE 2 OF 2
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED:** 1/29/07
PROJECT NAME: Michigan Meadows	**DRILLING METHOD:** Direct Push
PROJECT NO: M01046	**DRILL EQUIP:** Geoprobe 5400
DRILLING CONTRACTOR: Midway Services, Inc.	**GW DEPTH (OBSERVED):** 19'
DRILLER: Mark Hicks / J.R. Todish	**DEPTH OF BORING:** 40.0'
BORING LOCATION: Northwest corner of Olin Ave. and Cossell Rd. intersection	**TOP OF CASING ELEVATION:** N/A
FIELD GEOLOGIST: Leena Lothe & April Nelson	**SURFACE ELEVATION:** N/A
NOTES: 2 GW samples: MMW-P-09 (30'), (40')	**COMMENTS:** Same location as GP-C-03

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
- End of Boring at 40'					✱		40.0	

MUNDELL & ASSOCIATES, INC.
BORING LOG

BORING NO: MMW-P-10D

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: E side of plaza parking lot, S of MMW-P-08
FIELD GEOLOGIST: April Nelson & Leena Lothe
NOTES:

DATE BEGAN: 6/1/07
DATE FINISHED: 6/1/07
DRILLING METHOD: Direct Push / HSA
DRILL EQUIP: Geoprobe 5400 / BK 51 HD
GW DEPTH (OBSERVED): 18.5'
DEPTH OF BORING: 37.5'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
							0.0	
- Blind drilled								
							5.0	
							10.0	
							15.0	
								▼
							20.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-P-10D

CLIENT: AIMCO	**DATE BEGAN:** 6/1/07 PAGE 2 OF 2
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED:** 6/1/07
PROJECT NAME: Michigan Meadows	**DRILLING METHOD:** Direct Push / HSA
PROJECT NO: M01046	**DRILL EQUIP:** Geoprobe 5400 / BK 51 HD
DRILLING CONTRACTOR: Midway Services, Inc.	**GW DEPTH (OBSERVED):** 18.5'
DRILLER: Mark Hicks / J.R. Todish	**DEPTH OF BORING:** 37.5'
BORING LOCATION: E side of plaza parking lot, S of MMW-P-08	**TOP OF CASING ELEVATION:** N/A
FIELD GEOLOGIST: April Nelson & Leena Lothe	**SURFACE ELEVATION:** N/A
NOTES:	**COMMENTS:**

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
							25.0	
							30.0	
							35.0	
End of boring @ 37.5'								
							40.0	

Boring/Well ID: MMW-P-10D-A

CLIENT: AMMH	FIELD SCIENTIST: Gabriel Hebert
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/8/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/8/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): NA
BORING LOCATION:	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments
0	FB		FILL					
1	SW		SAND	1.0				
2	CL		SILTY CLAY	2.0				
3								
4			Blank Drill 4 ft to 20 ft	4.0				
5								
6								
7					0.0			
8								
9					0.05			
10						45		
11					0.15			
12								
13					NR			
14						0		
15					NR			
16								
17					0.0			
18						50		
19					NR			
20	SW		fine to medium SAND, yellowish brown (10YR 6/6), wet					
21	CL		SILTY CLAY, gray (10YR 5/1), slightly moist, stiff, slightly plastic	21.0	0.7			
22						75		
23	SW		Fine to medium SAND, grayish brown (10YR 5/2), wet, non-plastic	23.0	1.7		S	22-24'
24								

MMW-P-10D

2" Dia. Borehole

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

NR = Not Recorded

Boring/Well ID: MMW-P-10D-A

CLIENT: AMMH	FIELD SCIENTIST: Gabriel Hebert
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/8/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/8/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): NA
BORING LOCATION:	SURFACE ELEVATION: NS

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	MMW-P-10D
24	SW								
25					0.45				
26						75			
27			fine to coarse SAND and fine to coarse GRANULES, gray (10YR 5/1), wet	27.0	0.4				
28									
29					2.0				
30						75			
31					3.05				
32									2" Dia. Borehole
33					6.4		S	32-34'	
34						100			
35					3.8				
36									
37					0.25		S	36-38'	
38						100			
39	CL		SILTY CLAY, gray (10YR 5/1), slightly moist, stiff	38.5	0.3				
40			End of Boring 40 ft	40.0					
41									
42									
43									
44									
45									
46									
47									
48									

REMARKS:
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USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

NR = Not Recorded

MUNDELL & ASSOCIATES, INC.
BORING LOG

BORING NO: MMW-P-10S

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: E side of plaza parking lot, S of MMW-P-08
FIELD GEOLOGIST: April Nelson & Megan Hill
NOTES:

DATE BEGAN: 5/31/07
DATE FINISHED: 6/1/07
DRILLING METHOD: Direct Push / HSA
DRILL EQUIP: Geoprobe 5400 / BK 51 HD
GW DEPTH (OBSERVED): 18.5'
DEPTH OF BORING: 28'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)
ASPHALT: 3 - 4" of ASPHALT		
FILL: 6 - 8" of FILL gravel, BASE COURSE		0.25
SW: FINE TO MEDIUM SAND with gravel, dry, pale brown (10 YR 6/3)	SW	1.0
CL: SILTY CLAY with gravel, dry, black (10 YR 2/1)	CL	2.0
CL: SANDY CLAY with gravel, slightly moist, dk brown (10 YR 3/3)	CL	3.0
CL: SILTY CLAY with gravel, slightly moist, dk brown (10 YR 3/3)	CL	3.5
SW: MEDIUM TO COARSE SAND with gravel, slightly moist, brown (10 YR 4/3)	SW	6.0
SW: MEDIUM TO COARSE SAND with gravel, wet, brown (10 YR 4/3)	SW	18.5
SW: MEDIUM TO COARSE SAND with gravel, wet, grayish-brown (10 YR 5/2)	SW	20.0

PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
0.1	75%			0.0	
0.1					
NR	65%			5.0	
0.1					
NR	65%			10.0	
0.1					
NR	45%				
0.1				15.0	
NR	50%	✱	SS 16-17'		
15.0					▼
0.1	100%			20.0	

MUNDELL & ASSOCIATES, INC.

BORING LOG

BORING NO: MMW-P-10S

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / J.R. Todish
BORING LOCATION: E side of plaza parking lot, S of MMW-P-08
FIELD GEOLOGIST: April Nelson & Megan Hill
NOTES:

DATE BEGAN: 5/31/07
DATE FINISHED: 6/1/07
DRILLING METHOD: Direct Push / HSA
DRILL EQUIP: Geoprobe 5400 / BK 51 HD
GW DEPTH (OBSERVED): 18.5'
DEPTH OF BORING: 28'
TOP OF CASING ELEVATION: N/A
SURFACE ELEVATION: N/A
COMMENTS:

Lithologic Description	USCS Symbol	Stratum Depth (feet)	PID Headspace (ppm)	Rec. %	Sample Location	Sample ID	Depth (feet)	Water Level Information
			0.1					
SP: FINE TO MEDIUM SAND, wet, grayish-brown (10 YR 5/2)	SP	23.0						
- Blind drilled		24.0					25.0	
End of boring @ 28'		28.0					30.0	

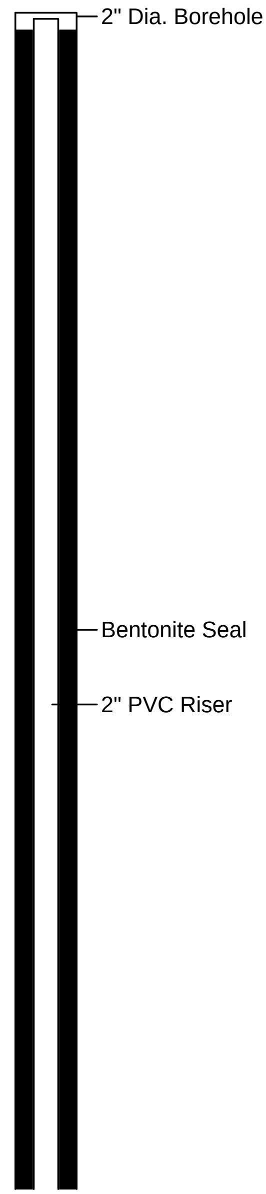
Boring/Well ID: MMW-P-11D

Mundell Consulting Professionals for the Earth and the Environment

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L. P. G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 8/31/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 8/31/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Doug Carlson	GW DEPTH (OBSERVED): 24.0 ft
BORING LOCATION: SW of Michigan Plaza	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0			Grass/Topsoil	0.5				
1	SM		SILTY SAND with trace gravel, brown (10YR 5/3), dense, dry		0.6			
2					-	75		
3					0.6			
4					-			
5	SW		SAND with some gravel, Well Graded, brown (10YR 5/3), loose, dry	5.0	0.7			
6					0.5	75		
7			No Recovery 7 to 8 ft		-			
8					0.6			
9								
10					0.3	75		
11			No Recovery 11 to12 ft		-			
12			Moist below 12 ft		0.4			
13			Yellowish red (5YR 5/8) oxidation 13 to 15 ft		0.4	75		
14					-			
15			No Recovery 15 to 16 ft					
16					0.6		*	Soil Sample SBP11D:160170
17	SM		Fine grained SILTY SAND with trace gravel, brown (10YR 5/3), moist	17.0	0.7	75		
18								
19			No Recovery 19 to 20 ft		-			
20								

MMW-P-11D



REMARKS:
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USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

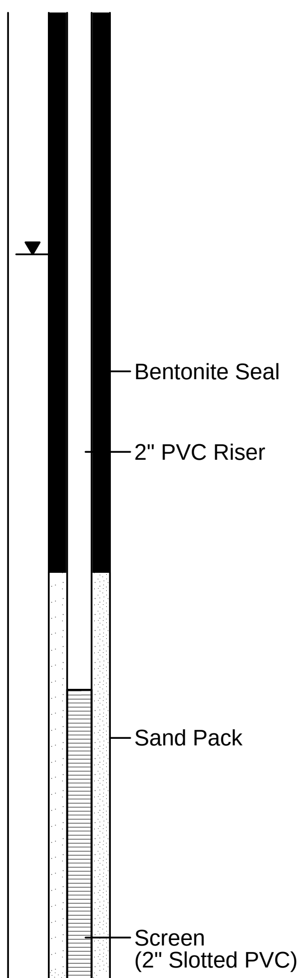
Boring/Well ID: MMW-P-11D

Mundell Consulting Professionals for the Earth and the Environment

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L. P. G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 8/31/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 8/31/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Doug Carlson	GW DEPTH (OBSERVED): 24.0 ft
BORING LOCATION: SW of Michigan Plaza	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
20–24	SW		SAND with trace gravel, Well Graded, brown (10YR 5/3), dense Fine to medium SAND 21 to 21.5 ft Medium to coarse SAND with trace gravel 21.5 to 23 ft No Recovery 23 to 24 ft	24.0	12.4 0.8 -	75		
24–30.5	SW-GW		Coarse SAND and GRAVEL, grayish brown (10YR 5/2), dense, wet No Recovery 25.5 to 28 ft Fine to coarse SAND 28 to 29 ft	30.5	0.8 - 0.7	38 83	*	Water Sample SBP11D:290
30.5–36.5	SW		Medium to coarse SAND with trace gravel, dense, wet No Recovery 31.5 to 32 ft No recovery 35 to 36 ft	36.5	1.2 - 1.3 1.2 -	83 75		
36.5–39	CL		SILTY CLAY, gray (2.5Y 5/1), moist Becomes stiff and dry at 39 ft	39.0	0.6 0.6	75	* *	Soil Sample SBP11D:370390 Water Sample SBP11D:390
39			End of boring at 39 ft					

MMW-P-11D



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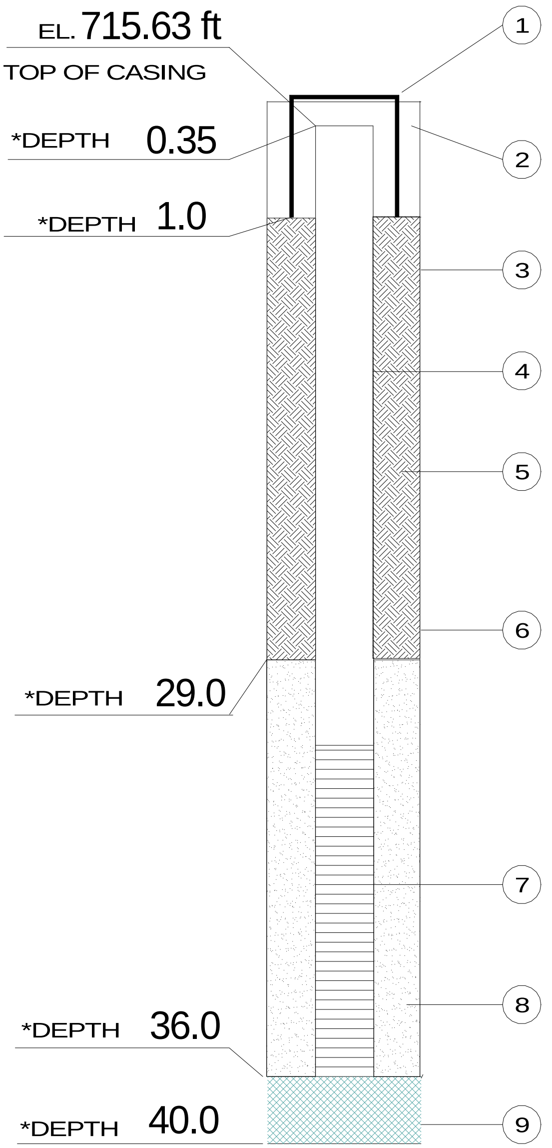
TPV = Total Photoionizable Vapors
NS = Not Surveyed

WELL CONSTRUCTION DIAGRAM

WELL NO. MMW-P-11DR



*DEPTH IN FEET BELOW GROUND LEVEL

1. PROTECTIVE CASING I.D. 8.0 INCHES
2. SURFACE SEAL TYPE Concrete Cement
3. BOREHOLE DIAMETER 2.0 INCHES
4. RISER PIPE:
   a. Type Schedule 40 PVC
   b. I.D. 2.0 INCHES
   c. Length 31.0 FEET
   d. Joint Type Flush Threaded
5. BACKFILL:
   a. Type Crushed Bentonite
   b. Installation Poured
6. TYPE OF SEAL Grout Barrier
7. SCREEN:
   a. Type Schedule 40 PVC
   b. I.D. 2.0 INCHES
   c. Slot Size 0.01 INCHES
   d. Length 5.0 FEET
8. SCREEN FILTER TYPE #4 Sand
9. BACKFILL TYPE Natural Cave / Poured Sand

DATE COMPLETED 12/6/11

DEVELOPMENT METHOD Submersible Pump

DRILLING CONTRACTOR Earth Exploration

DRILLER Sam Barthalow

RIG TYPE Hollow Stem Auger

GEOLOGIST/FIELD SCIENTIST
Sarah Webb, L.P.G.

WELL CONSTRUCTION DIAGRAM

Michigan Plaza / Michigan Apts.

Indianapolis, Indiana

Project Number: M01046	
Drawing File: MMW-P-11DR Construction Diagram	
Date Prepared: 12/15/11	
Scale: Not to Scale	
Drn. By: ABW	Ckd. By: SEW	Approved By: JAM

Mundell
Consulting Professionals
for the Earth and the Environment
110 South Downey Avenue
Indianapolis, Indiana 46219-6406

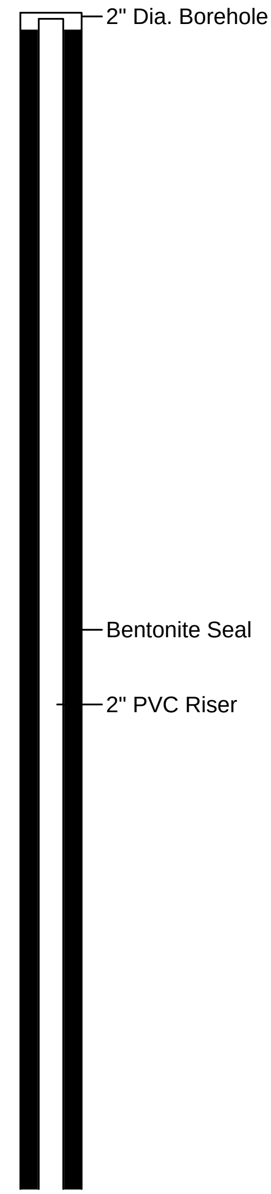
Boring/Well ID: MMW-P-11DR

Mundell Consulting Professionals for the Earth and the Environment

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/5/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/5/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 21.5 ft
BORING LOCATION: Cemetery Parking Lot	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0			Grass/Topsoil	.50	-	50		
1	SM		SILTY SAND with trace gravel, brown (10YR 5/3), dense, dry		0.3			
3			No recovery 2.0 - 4.0 ft	4	-			
4	SW		SAND with trace gravel, well graded, brown (10YR 5/3), dense, dry		0.5	50		
7			No Recovery 6.0 to 8.0 ft		-			
8					0.6	75		
9					0.7			
11			No Recovery 11.0 - 12.0 ft		-			
12					0.6	100		
14					0.7			
16					0.5	100		
17.5			Silty CLAY with coarse gravel seam at 17.5 ft. Brown (10YR 5/3) with yellowish red (5YR 5/8) oxidation	18.5				
18.5	SM		Fine grained SILTY SAND with trace gravel, brownish gray (10YR/ 6/2), stiff, moist		0.7			

MMW-P-11DR



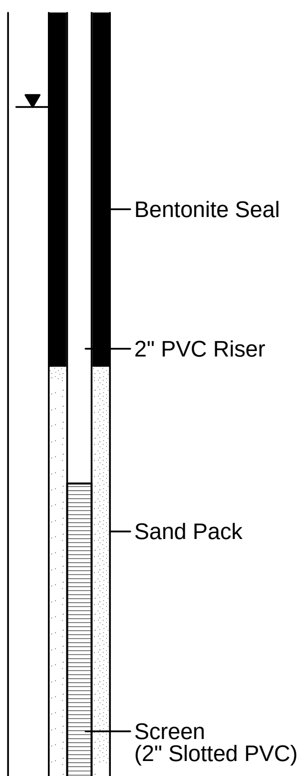
REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: MMW-P-11DR

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/5/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/5/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 21.5 ft
BORING LOCATION: Cemetery Parking Lot	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
20–21.5	SM		Wet at 21.5 ft	21.5	0.5	75		
21.5–24	SW-GW		Fine to coarse grained SAND and GRAVEL, brownish gray (10YR 6/3), dense, wet No Reocvery 23.0 - 24.0 ft	24	0.9 -			
24–28	SW-GW		Coarse grained SAND and GRAVEL, brownish gray (10YR 6/3), dense, wet No Recovery 25.5 - 28.0 ft	25.5 28	1.3 -	38		
28–31	SW-GW		Coarse grained SAND and GRAVEL, brownish gray (10YR 6/3), dense, wet	31	1.8	100		
31–32	SW-GW		Fine to medium grained SAND with trace gravel, brownish gray (10YR 6/3), dense, wet	32	2.4			
32–36	SW-GW		Cuttings indicate SAND and GRAVEL, well graded, brownish grey (10YR 6/3), dense, wet Significant sand heaving issues	36	-	100		
36–40	CL		SILTY CLAY, gray (2.5Y 5/1) very stiff, dry End of Boring at 40 ft		0.3 0.3	100		

MMW-P-11DR



REMARKS:
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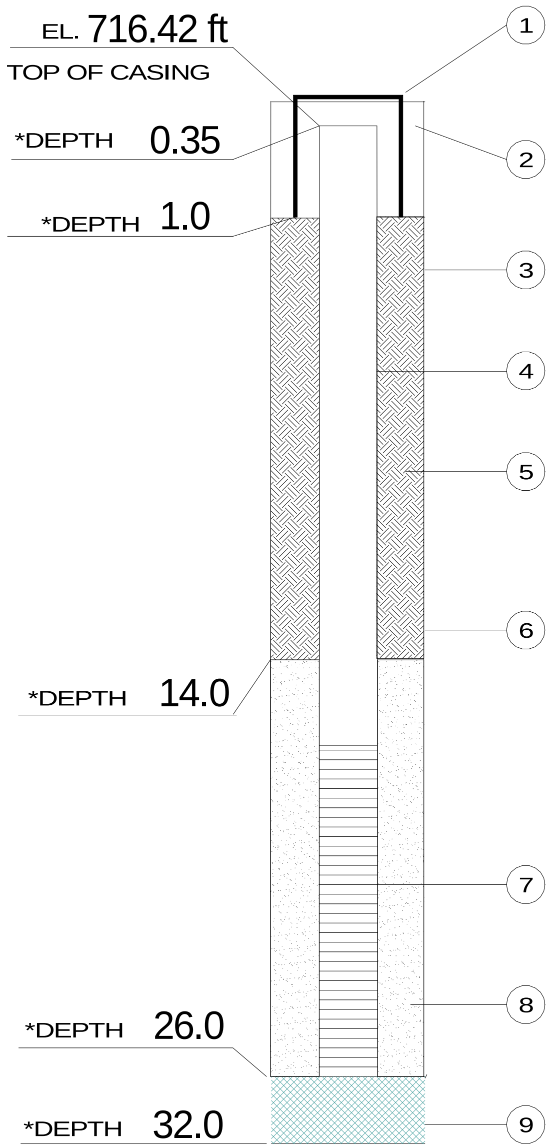
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

WELL CONSTRUCTION DIAGRAM

WELL NO. MMW-P-11S



*DEPTH IN FEET BELOW GROUND LEVEL

1. PROTECTIVE CASING I.D. 8.0 INCHES
2. SURFACE SEAL TYPE Concrete Cement
3. BOREHOLE DIAMETER 2.0 INCHES
4. RISER PIPE:
   a. Type Schedule 40 PVC
   b. I.D. 2.0 INCHES
   c. Length 16.0 FEET
   d. Joint Type Flush Threaded
5. BACKFILL:
   a. Type Crushed Bentonite
   b. Installation Poured
6. TYPE OF SEAL Grout Barrier
7. SCREEN:
   a. Type Schedule 40 PVC
   b. I.D. 2.0 INCHES
   c. Slot Size 0.01 INCHES
   d. Length 10.0 FEET
8. SCREEN FILTER TYPE #4 Sand
9. BACKFILL TYPE Natural Cave / Poured Sand

DATE COMPLETED 8/31/11

DEVELOPMENT METHOD Submersible Pump

DRILLING CONTRACTOR Earth Exploration

DRILLER Doug Carlson

RIG TYPE Hollow Stem Auger

GEOLOGIST/FIELD SCIENTIST
Sarah Webb, L.P.G.

WELL CONSTRUCTION DIAGRAM

Michigan Plaza / Michigan Apts.

Indianapolis, Indiana

Project Number: M01046

Drawing File: MMW-P-11S Construction Diagram

Date Prepared: 12/15/11

Scale: Not to Scale

Drn. By: ABW | Ckd. By: SEW | Approved By: JAM

Mundell
Consulting Professionals
for the Earth and the Environment

110 South Downey Avenue
Indianapolis, Indiana 46219-6406

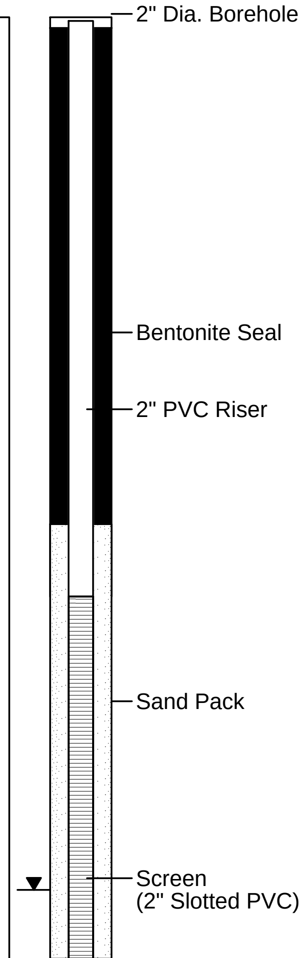
Boring/Well ID: MMW-P-11S

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L. P. G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 8/31/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 8/31/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Doug Carlson	GW DEPTH (OBSERVED): 24.0 ft
BORING LOCATION: SW of Michigan Plaza	SURFACE ELEVATION: NS
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)
0–0.5			Grass/Topsoil	0.5
0.5–1.5	SM		SILTY SAND with trace gravel, brown (10YR 5/3), dense, dry	1.5
1.5–4.5	SW		SAND with trace gravel, Well Graded, brown (10YR 5/3), loose No Recovery 3 to 4 ft	4.5
4.5–5.0	SM		SILTY SAND with trace gravel, brown (10YR 5/3), dense	5.0
5.0–8.0	SW-GW		SAND and GRAVEL, Well Graded, brown (10YR 5/3), loose, moist No Recovery 7 to 8 ft	8.0
8.0–24.0	SW		SAND with some gravel, Well Graded, brown (10YR 5/3), loose, moist Fine SAND seam with yellowish red (5YR 5/8) oxidation at 9.5 ft No Recovery 11 to 12 ft Rock in shoe 12 to 16 ft, cuttings indicate fine to medium SAND with trace gravel, brown (10YR 5/3) SILT with gravel seams, moist at 17.5 and 18 ft No Recovery 18.5 to 20 ft Medium to coarse SAND with trace gravel, brownish gray (10YR 6/2), wet 20 to 23 ft Coarse SAND and GRAVEL at 21 ft No Recovery 23 to 24 ft	24.0
24.0–32.0	SW-GW		Fine to coarse SAND and GRAVEL, grayish brown (10YR 5/2), dense, wet No Recovery 25.5 to 28 ft No Recovery 29 to 32 ft	32.0
			End of boring at 32 ft	

Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0–2	0.9	75		
2–3	0.6			
3–4	-			
4–5	0.8	75		
5–7	1.2			
7–8	-			
8–9	1.1	75		
9–11	1.5			
11–12	-			
12–16	-	0		
16–17	1.2	63		
17–19	1.8			
19–20	-			
20–22	13.0	75		
22–23	2.5			
23–24	-			
24–25.5	1.8	38		
25.5–28	-			
28–29	1.5	25		
29–32	-			

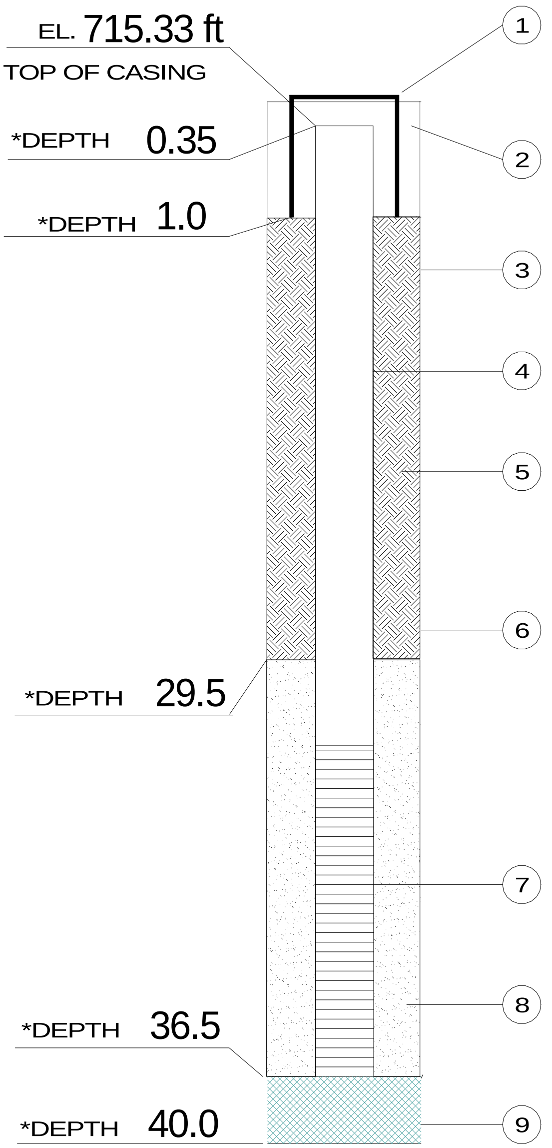
MMW-P-11S



REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

WELL CONSTRUCTION DIAGRAM

WELL NO. MMW-P-12D



*DEPTH IN FEET BELOW GROUND LEVEL

1. PROTECTIVE CASING I.D. 8.0 INCHES
2. SURFACE SEAL TYPE Concrete Cement
3. BOREHOLE DIAMETER 2.0 INCHES
4. RISER PIPE:
   a. Type Schedule 40 PVC
   b. I.D. 2.0 INCHES
   c. Length 31.5 FEET
   d. Joint Type Flush Threaded
5. BACKFILL:
   a. Type Crushed Bentonite
   b. Installation Poured
6. TYPE OF SEAL Grout Barrier
7. SCREEN:
   a. Type Schedule 40 PVC
   b. I.D. 2.0 INCHES
   c. Slot Size 0.01 INCHES
   d. Length 5.0 FEET
8. SCREEN FILTER TYPE #4 Sand
9. BACKFILL TYPE Natural Cave / Poured Sand

DATE COMPLETED 9/1/11

DEVELOPMENT METHOD Submersible Pump

DRILLING CONTRACTOR Earth Exploration

DRILLER Doug Carlson

RIG TYPE Hollow Stem Auger

GEOLOGIST/FIELD SCIENTIST
Sarah Webb, L.P.G.

WELL CONSTRUCTION DIAGRAM

Michigan Plaza / Michigan Apts.

Indianapolis, Indiana

Project Number: M01046

Drawing File: MMW-P-12D Construction Diagram

Date Prepared: 12/15/11

Scale: Not to Scale

Drn. By: ABW | Ckd. By: SEW | Approved By: JAM

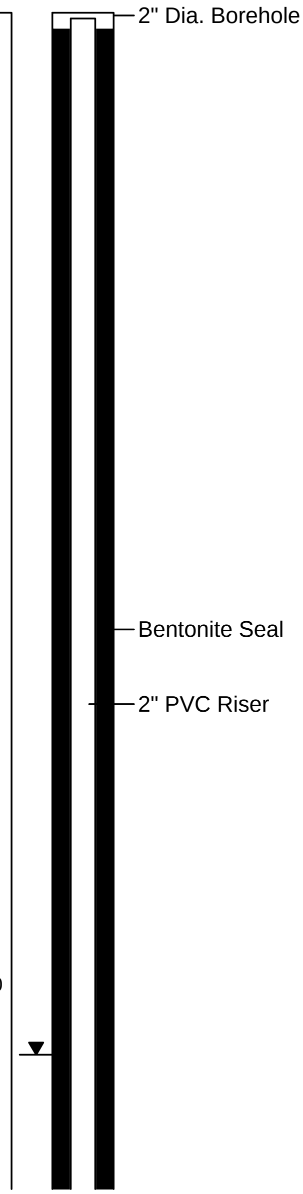
Mundell
Consulting Professionals
for the Earth and the Environment
110 South Downey Avenue
Indianapolis, Indiana 46219-6406

Boring/Well ID: MMW-P-12D

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L. P. G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 9/1/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 9/1/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Doug Carlson	GW DEPTH (OBSERVED): 18.5 ft
BORING LOCATION: NW of Michigan Plaza	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0–0.5			Asphalt/Topsoil	0.5				
0.5–5	SM		SILTY SAND with trace gravel, dark brown (7.5YR 3/2), dense, dry No Recovery 3 to 4 ft	5.0	3.6 2.7 -	75		
5–14	SW		SAND with some gravel, Well Graded, brown (10YR 5/3), loose, dry No Recovery 7 to 8 ft Yellowish red (5YR 5/8) oxidation 10 to 10.5 ft No Recovery 10.5 to 12 ft	14.0	7.0 3.7 - 3.8 4.8 - 7.9	75 63		
14–14.5	ML		SILT with trace sand, brown (10YR 5/3), loose, moist	14.5		75		
14.5–16	SM		Fine SILTY SAND, brown (10YR 5/3) with yellowish red (5YR 5/8) oxidation, loose, moist No Recovery 15 to 16 ft	16.0	11.0 -			
16–18.5	SW		Fine to medium SAND with trace gravel, brown (10YR 5/3), dense Yellowish red (5YR 5/8) oxidation at 17.5 ft	18.5	13.8	75	*	Soil Sample SBP12D:160180
18.5–20	SW-GW		SAND and GRAVEL, Well Graded, gray (2.5Y 5/1), dense, wet No Recovery 19 to 20 ft	20.0	12.1 -			
20–21	SW		Fine to medium SAND with trace gravel, brownish gray (10YR 6/2), dense, wet		2.9	75		

MMW-P-12D



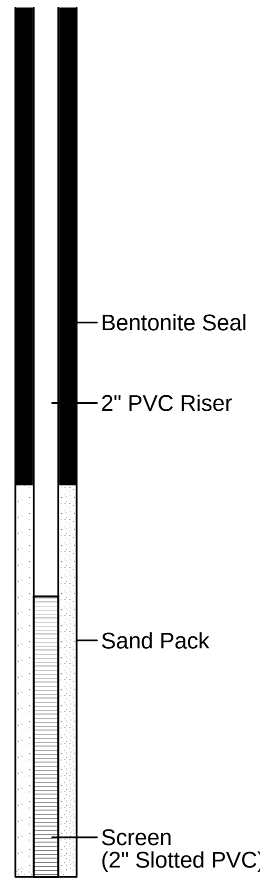
REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: MMW-P-12D

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L. P. G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 9/1/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 9/1/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Doug Carlson	GW DEPTH (OBSERVED): 18.5 ft
BORING LOCATION: NW of Michigan Plaza	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
21	CL	SILTY CLAY, brownish gray (10YR 6/2), hard, plastic, wet	21.0				
21.5	SW-GW	SAND and GRAVEL, Well Graded, brownish gray (10YR 6/2), wet	21.5	2.9			
22				1.3	75		
23		Coarse SAND and GRAVEL, gray (2.5Y 5/1) 22.5 to 23 ft		-			
24		No Recovery 23 to 24 ft		2.4			
25		No Recovery 25 to 32 ft		-	25		
26						*	Water Sample SBP12D:260
28					0		
32				3.5	100		
34				9.3			
36	SW	Fine SAND, brown (10YR 5/3), dense, wet	36.0			*	Water Sample SBP12D:360
36.5	CL	SILTY CLAY, gray (2.5Y 5/1), stiff, dry	36.5	6.5	25	*	Soil Sample SBP12D:360370
37		No Recovery 37 to 40 ft		-			
40		End of boring at 40 ft	40.0				

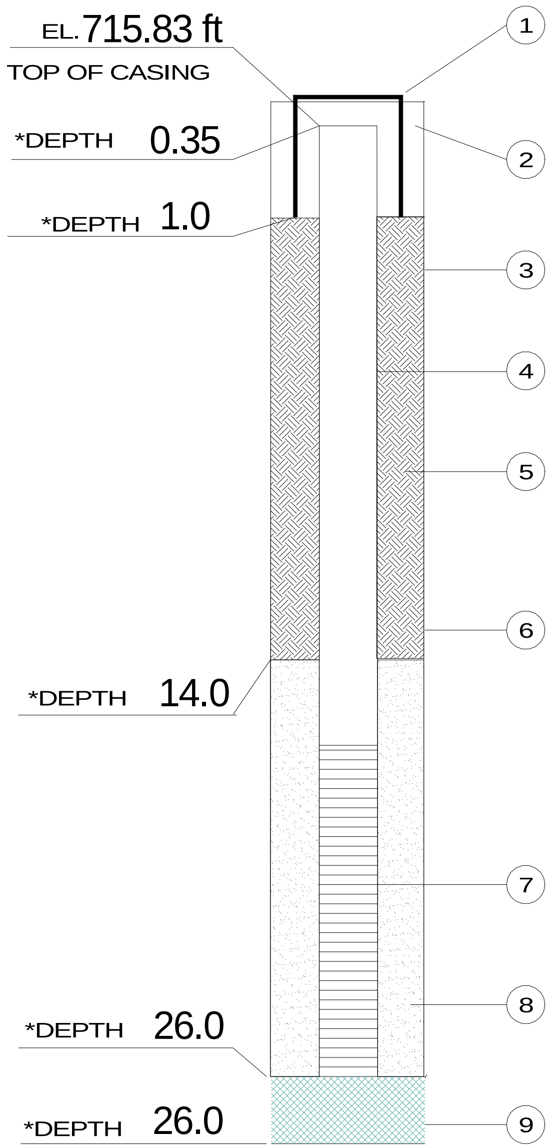
MMW-P-12D



REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

WELL CONSTRUCTION DIAGRAM

WELL NO. MMW-P-12S



*DEPTH IN FEET BELOW GROUND LEVEL

1. PROTECTIVE CASING I.D. 8.0 INCHES
2. SURFACE SEAL TYPE Concrete Cement
3. BOREHOLE DIAMETER 2.0 INCHES
4. RISER PIPE:
   a. Type Schedule 40 PVC
   b. I.D. 2.0 INCHES
   c. Length 16.0 FEET
   d. Joint Type Flush Threaded
5. BACKFILL:
   a. Type Crushed Bentonite
   b. Installation Poured
6. TYPE OF SEAL Grout Barrier
7. SCREEN:
   a. Type Schedule 40 PVC
   b. I.D. 2.0 INCHES
   c. Slot Size 0.01 INCHES
   d. Length 10.0 FEET
8. SCREEN FILTER TYPE #4 Sand
9. BACKFILL TYPE Natural Cave / Poured Sand

DATE COMPLETED 9/1/11

DEVELOPMENT METHOD Submersible Pump

DRILLING CONTRACTOR Earth Exploration

DRILLER Doug Carlson

RIG TYPE Hollow Stem Auger

GEOLOGIST/FIELD SCIENTIST
Sarah Webb, L.P.G.

WELL CONSTRUCTION DIAGRAM

Michigan Plaza / Michigan Apts.

Indianapolis, Indiana

Project Number: M01046	
Drawing File: MMW-P-12S Construction Diagram	
Date Prepared: 12/15/11	
Scale: Not to Scale	
Drn. By: ABW	Ckd. By: SEW	Approved By: JAM

Mundell
Consulting Professionals for the Earth and the Environment
110 South Downey Avenue
Indianapolis, Indiana 46219-6406

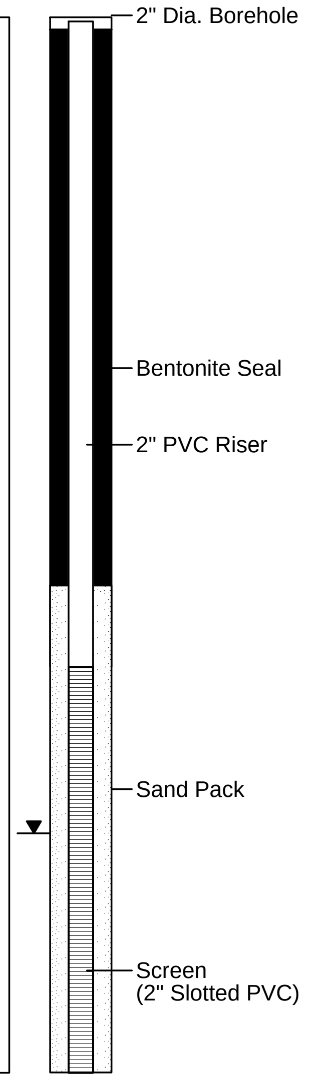
Boring/Well ID:	MMW-P-12S

Mundell Consulting Professionals for the Earth and the Environment

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L. P. G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 9/1/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 9/1/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Doug Carlson	GW DEPTH (OBSERVED): 20.0 ft
BORING LOCATION: NW of Michigan Plaza	SURFACE ELEVATION: NS
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0		Asphalt	0.5				
1	SM	SILTY SAND with trace gravel, brown (10YR 5/3), dense, dry		3.7	75		
2				4.4			
3		No Recovery 3 to 4 ft		-			
5	SW	SAND with trace gravel, Well Graded, brown (10YR 5/3), loose	5.0	7.5	75		
6				6.3			
7		No Recovery 7 to 8 ft		-			
9		Some GRAVEL 8 to 11 ft		8.6	75		
10				8.3			
11		No Recovery 11 to 12 ft		-			
12	SM	SILTY SAND, Well Graded, brown (10YR 5/3), dense, dry	12.0				
13	SW	SAND with some gravel, Well Graded, brown (10YR 5/3) with some yellowish red (5YR 5/8) oxidation, dense	13.0	13.2	50		
15		No Recovery 14 to 16 ft		-			
17		Fine to medium SAND, moist 16 to 18 ft		35.6	50		
19		No Recovery 18 to 20 ft		-			
20	SW-GW	SAND and GRAVEL, Well Graded, grayish brown (10YR 5/2), dense, wet	20.0	4.2	38		
		Fine to medium SAND 20.5 to 21 ft					
21	CL	SILTY CLAY, gray (2.5YR 5/1), stiff, wet	21.0				
21.5	SW	Fine to medium SAND with trace gravel, grayish brown (10YR 5/2), dense, wet	21.5				
		Medium to coarse SAND and GRAVEL seam at 21.5 ft					
23		No Recovery 22.5 to 24 ft		-			
24	GW	Fine to coarse GRAVEL, brownish gray (10YR 6/2), dense, wet	24.0	5.5	100		
		SAND and GRAVEL 25.5 to 26 ft	26.0				
26		End of boring at 26 ft					

MMW-P-12S



REMARKS:
BGS = Below Ground Surface
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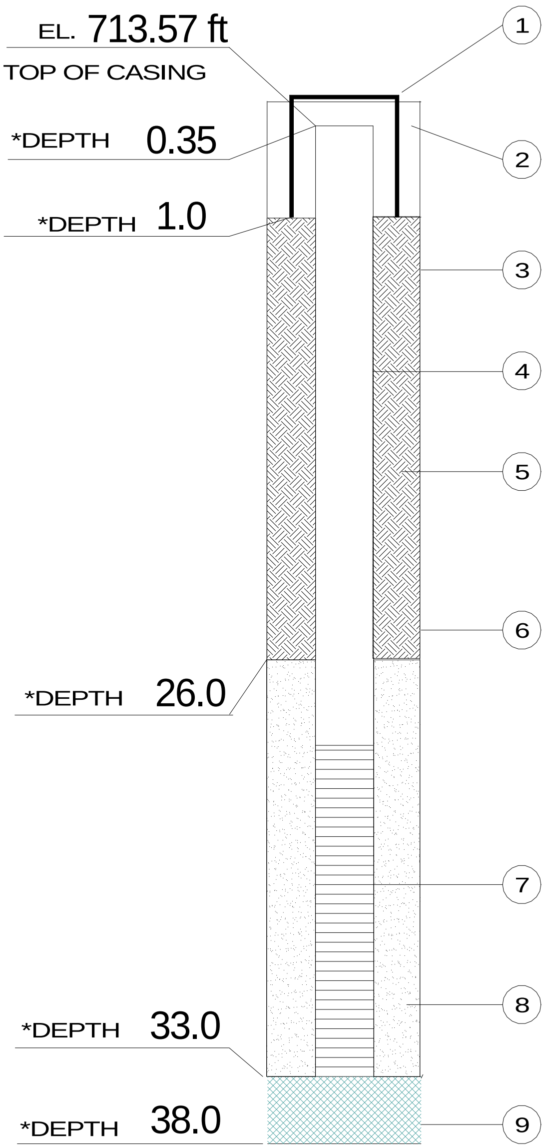
TPV = Total Photoionizable Vapors
NS = Not Surveyed

WELL CONSTRUCTION DIAGRAM

WELL NO. MMW-P-13D



*DEPTH IN FEET BELOW GROUND LEVEL

1. PROTECTIVE CASING I.D. 8.0 INCHES
2. SURFACE SEAL TYPE Concrete Cement
3. BOREHOLE DIAMETER 2.0 INCHES
4. RISER PIPE:
   a. Type Schedule 40 PVC
   b. I.D. 2.0 INCHES
   c. Length 28.0 FEET
   d. Joint Type Flush Threaded
5. BACKFILL:
   a. Type Crushed Bentonite
   b. Installation Poured
6. TYPE OF SEAL Grout Barrier
7. SCREEN:
   a. Type Schedule 40 PVC
   b. I.D. 2.0 INCHES
   c. Slot Size 0.01 INCHES
   d. Length 5.0 FEET
8. SCREEN FILTER TYPE #4 Sand
9. BACKFILL TYPE Natural Cave / Poured Sand

DATE COMPLETED 8/31/11

DEVELOPMENT METHOD Submersible Pump

DRILLING CONTRACTOR Earth Exploration

DRILLER Doug Carlson

RIG TYPE Hollow Stem Auger

GEOLOGIST/FIELD SCIENTIST
Sarah Webb, L.P.G.

WELL CONSTRUCTION DIAGRAM

Michigan Plaza / Michigan Apts.

Indianapolis, Indiana

Project Number: M01046

Drawing File: MMW-P-13D Construction Diagram

Date Prepared: 12/15/11

Scale: Not to Scale

Drn. By: ABW | Ckd. By: SEW | Approved By: JAM

Mundell
Consulting Professionals
for the Earth and the Environment
110 South Downey Avenue
Indianapolis, Indiana 46219-6406

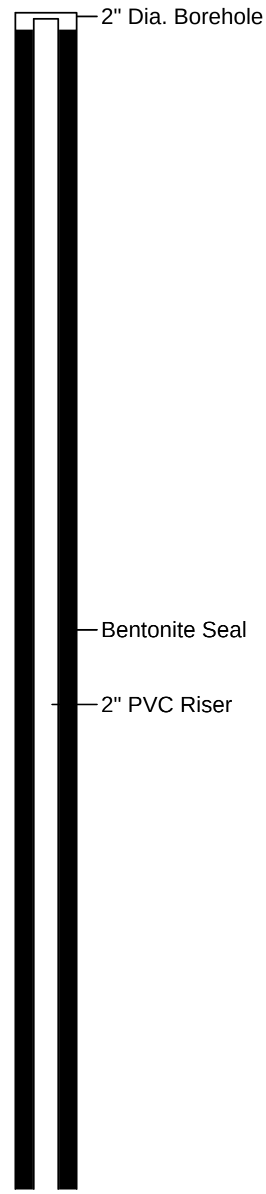
Boring/Well ID: MMW-P-13D

Mundell Consulting Professionals for the Earth and the Environment

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L. P. G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 8/31/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 8/31/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Doug Carlson	GW DEPTH (OBSERVED): 20.0 ft
BORING LOCATION: W of Michigan Plaza	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0		Grass/Topsoil	0.5				
1		SILTY SAND with trace gravel, brown (10YR 5/3), dense		0.8			
2	SM	Fine to medium SAND, loose 2.5 to 3 ft		0.8	75		
3		No Recovery 3 to 4 ft		-			
4		SAND and GRAVEL, Well Graded, brown (10YR 5/3), loose, dry	4.0				
5				0.9			
6					50		
7		No Recovery 6 to 8 ft		-			
8							
9	SW-GW			1.0			
10				1.0	75		
11		No Recovery 11 to 12 ft		-			
12		Yellowish red (5YR 5/8) oxidation 12 to 13.5 ft					
13			13.5	0.9			
14		SAND with trace gravel, Well Graded, brown (10YR 5/3), loose, moist		1.2	75		
15	SW	No Recovery 15 to 16 ft		-			
16							
17			17.5	0.7		*	Soil Sample SBP13D:160180
18	ML	SILT and fine SAND with trace coarse sand and gravel, brown (10YR 5/3), dense, moist	18.0	1.2	75		
19	SW	Fine to medium SAND with trace gravel, brown (10YR 5/3), dense; No Recovery 19 to 20 ft		-			
20							

MMW-P-13D



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TPV = Total Photoionizable Vapors
NS = Not Surveyed

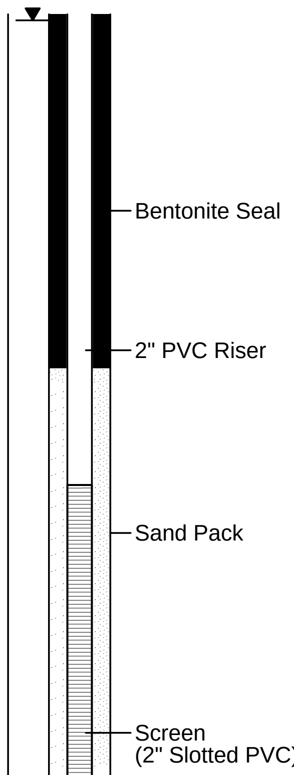
Boring/Well ID: MMW-P-13D

Mundell Consulting Professionals for the Earth and the Environment

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L. P. G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 8/31/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 8/31/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Doug Carlson	GW DEPTH (OBSERVED): 20.0 ft
BORING LOCATION: W of Michigan Plaza	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
20	SW-GW		Coarse SAND and GRAVEL, brown (10YR 5/3), dense, wet	20.0				
21					1.3			
22			Fine to medium SAND 22 to 22.5 ft		1.6	75		
23			No Recovery 23 to 24 ft		-			
24			Fine SAND 24 to 25 ft				*	Water Sample SBP13D:240
25					1.2			
26						50		
27			No Recovery 26 to 28 ft		-			
28					3.1			
29			Color change to brownish gray (10YR 6/2) 28 to 30.5 ft		2.5			
30						63		
31			No Recovery 30.5 to 32 ft		-			
32			Color change to gray (2.5Y 5/1) 32 to 33 ft		2.5		*	Water Sample SBP13D:320
33	CL		SILTY CLAY, gray (2.5Y 5/1), stiff, dry	33.0				
34					1.3	75		
35			No recovery 35 to 36 ft		-			
36								
37					1.8	100	*	Soil Sample SBP13D:360380
38			End of boring at 38 ft	38.0				
39								
40								

MMW-P-13D



REMARKS:
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TPV = Total Photoionizable Vapors
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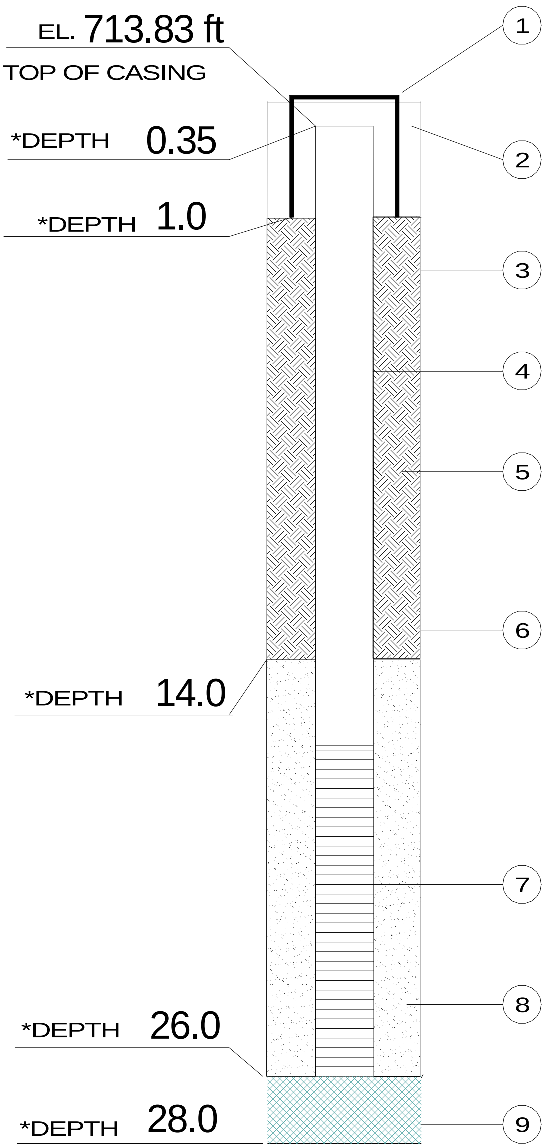
WELL CONSTRUCTION DIAGRAM

WELL NO. MMW-P-13S



*DEPTH IN FEET BELOW GROUND LEVEL

GEOLOGIST/FIELD SCIENTIST
Sarah Webb, L.P.G.

1. PROTECTIVE CASING I.D. 8.0 INCHES
2. SURFACE SEAL TYPE Concrete Cement
3. BOREHOLE DIAMETER 2.0 INCHES
4. RISER PIPE:
   a. Type Schedule 40 PVC
   b. I.D. 2.0 INCHES
   c. Length 16.0 FEET
   d. Joint Type Flush Threaded
5. BACKFILL:
   a. Type Crushed Bentonite
   b. Installation Poured
6. TYPE OF SEAL Grout Barrier
7. SCREEN:
   a. Type Schedule 40 PVC
   b. I.D. 2.0 INCHES
   c. Slot Size 0.01 INCHES
   d. Length 10.0 FEET
8. SCREEN FILTER TYPE #4 Sand
9. BACKFILL TYPE Natural Cave / Poured Sand

DATE COMPLETED 8/31/11

DEVELOPMENT METHOD Submersible Pump

DRILLING CONTRACTOR Earth Exploration

DRILLER Doug Carlson

RIG TYPE Hollow Stem Auger

WELL CONSTRUCTION DIAGRAM

Michigan Plaza / Michigan Apts.

Indianapolis, Indiana

Project Number: M01046

Drawing File: MMW-P-13S Construction Diagram

Date Prepared: 12/15/11

Scale: Not to Scale

Drn. By: ABW | Ckd. By: SEW | Approved By: JAM

Mundell
Consulting Professionals for the Earth and the Environment
110 South Downey Avenue
Indianapolis, Indiana 46219-6406

Boring/Well ID: MMW-P-13S

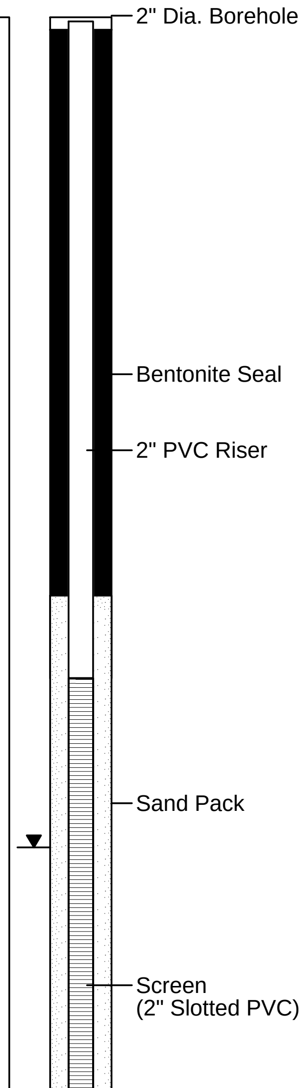
Mundell Consulting Professionals
for the Earth and the Environment

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 8/31/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 8/31/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Doug Carlson	GW DEPTH (OBSERVED): 20.0 ft
BORING LOCATION: W of Michigan Plaza	SURFACE ELEVATION: NS
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)
0–0.5		Grass/Topsoil	0.5
0.5–4	SM	SILTY SAND with trace gravel, brown (10YR 5/3), very dense Fine SAND at 2 ft No Recovery 2 to 4 ft	4.0
4–16	SW-GW	SAND and GRAVEL, Well Graded, brown (10YR 5/3), loose, dry No Recovery 6.5 to 8 ft More dense 8 to 11 ft No Recovery 11 to 12 ft Yellowish red (5YR 5/8) oxidation 12 to 13.5 ft No Recovery 15 to 16 ft	16.0
16–17.5	SW	Fine to medium SAND with trace gravel, brown (10YR 5/3), dense, moist Yellowish red (5YR 5/8) oxidation at 17 ft	17.5
17.5–18	ML	SILT with trace sand and gravel, brownish gray (10YR 6/2), stiff, moist	18.0
18–28	SW-GW	Coarse SAND and GRAVEL, brown (10YR 5/3), dense No Recovery 19 to 20 ft Wet below 20 ft No Recovery 23 to 24 ft Fine SAND with trace coarse sand 24 to 25 ft Fine SAND with trace coarse sand and gravel 25.5 to 26 ft No Recovery 27.5 to 28 ft	28.0
		End of boring at 28 ft	

Depth BGS (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0–2	1.5	60		
2–4	-			
4–5	0.6	63		
5–6.5	0.9			
6.5–8	-			
8–10	1.3	75		
10–11	1.3			
11–12	-			
12–14	1.6	75		
14–15	1.4			
15–16	-			
16–18	1.6	75		
18–19	1.5			
19–20	-			
20–22	1.4	75		
22–23	1.7			
23–24	-			
24–26	2.3	88		
26–27.5	2.3			
27.5–28	-			

MMW-P-13S



REMARKS:
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USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

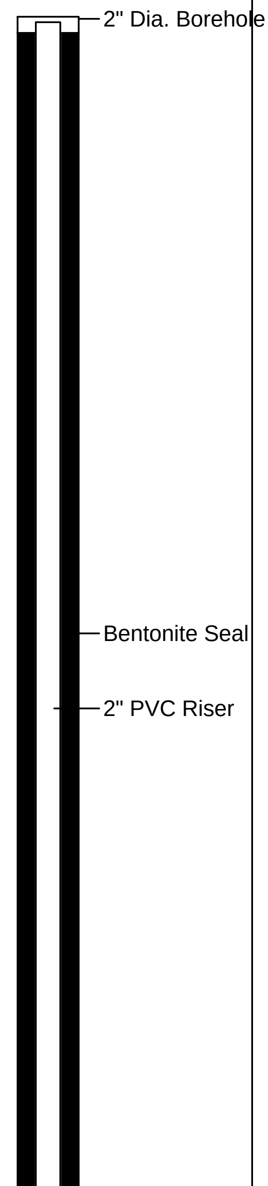
Boring/Well ID: MMW-P-14D

Mundell Consulting Professionals for the Earth and the Environment

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/6/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/6/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 23.0 ft
BORING LOCATION: E Side of Holt S of Mich	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
0		Grass/Topsoil	.50				
1	CL	SILTY CLAY with trace sand, brown (10YR 5/3), stiff, moist		0.2			
2					50		
3		No Recovery 2.0 - 4.0 ft		-			
4	SW	Fine to medium grained SAND with trace gravel, well graded, light brown (10YR 5/6), dense, moist	4.0				
5				0.3			
6					100		
7				0.4			
8		yellowish red (5YR 5/8) oxidation from 8.5 - 9.0 ft					
9				0.3			
10	SW-GW	SAND and GRAVEL, well graded, brown (10YR 5/3), dense, moist			100		
11				0.2			
12		yellowish red (5YR 5/8) oxidation at 12.5 ft	12.0				
13				0.2			
14					100		
15				0.2			
15.5	CL	SILTY CLAY, gray (2.5Y 5/1), stiff, moist	15.5				
16	SW	Fine to coarse grained SAND with a little gravel, well graded, brown (10YR 5/3), dense, moist	16.0				
17				0.3			
18		Fine grained sand seam from 16.5 - 17.5 ft			100		
19	SW	Fine to medium grained SAND with trace gravel, well graded, brown (10YR 5/3) dense, moist	19.0	0.3		*	Soil Sample: MMW-P-14D 19 - 20'
20	SW-GW	SAND and GRAVEL, well graded, brown (10YR 5/3), moist, dense	20.0				
21				0.2	100		
22							

MMW-P-14D



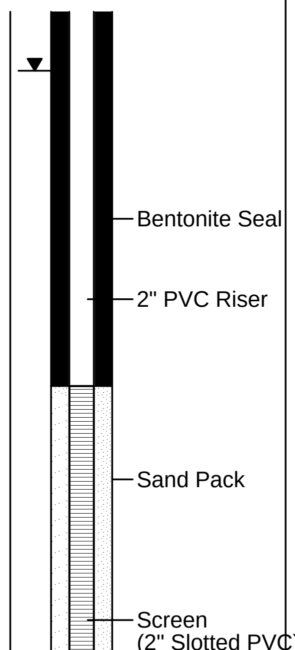
REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: MMW-P-14D

CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/6/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/6/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 23.0 ft
BORING LOCATION: E Side of Holt S of Mich	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID
22								
23			Wet at 23.0 ft		0.2	100		
24							*	Water Sample: MMW-P-14D 24'
25	SW-GW				0.2			
26						50		
27			No Recovery 26.0 - 28.0 ft		-			
28			SAND and GRAVEL, well graded, gray (2.5Y 5/1), dense, wet	28.0				
29								
30					-	50		
31			No Recovery 30.0 - 32.0 ft					
32	SW-GW							
33			gray silty clay seam from 33.5 -34.0 ft		0.2			
34						50	*	Water Sample: MMW-P-14D 34'
35			No Recovery 34.0 - 36.0 ft		-			
36			SILTY CLAY with trace gravel, gray (2.5Y 5/1), stiff, moist	36				
37					0.3			
38	CL					100		
39					0.1		*	Soil Sample: MMW-P-14D 38 - 40'
40			End of boring at 40.0 ft	40				
41								
42								
43								
44								

MMW-P-14D



REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Boring/Well ID: MMW-P-14S

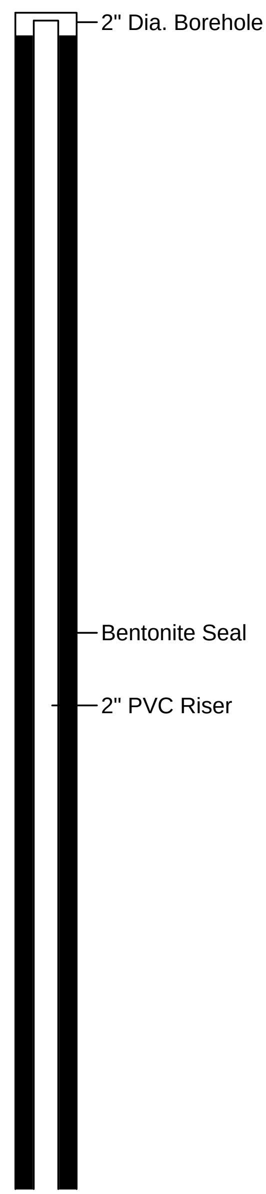
CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/6/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/6/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 20.0
BORING LOCATION: E Side of Holt S of Mich	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)
0 – 0.5			Grass/Topsoil	.50
0.5 – 4.0	CL		SILTY CLAY with trace sand, dark brown (10YR 3/3), loose, moist No recovery 2.0 - 4.0 ft	4.0
4.0 – 9.5	SW-GW		SAND and GRAVEL, well graded, brown (10YR 5/3), loose, dry	9.5
9.5 – 12.0	SM		Fine to medium grained SAND with trace gravel, well graded, brown (10YR 5/3), dense, moist No Recovery 11.0 - 12.0 ft	12.0
12.0 – 15	SW-GW		SAND and GRAVEL, poorly graded, brown (10YR5/3), dense, moist Medium to fine grained sand seam, brown (10YR 5/3), at 13.0 ft No Recovery 14.0 - 16.0 ft	

Depth BGS (ft)	TPV (ppm)
0 – 2	0.1
2 – 4	-
4 – 6	0.2
6 – 8	0.3
8 – 9.5	0.2
9.5 – 11	0.2
11 – 12	-
12 – 14	0.2
14 – 15	-

Depth BGS (ft)	Recovery %	Sample Location	Sample ID
0 – 4	50		
4 – 8	100		
8 – 12	75		
12 – 15	50		

MMW-P-14S



REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

Mundell Consulting Professionals for the Earth and the Environment

Boring/Well ID: MMW-P-14S

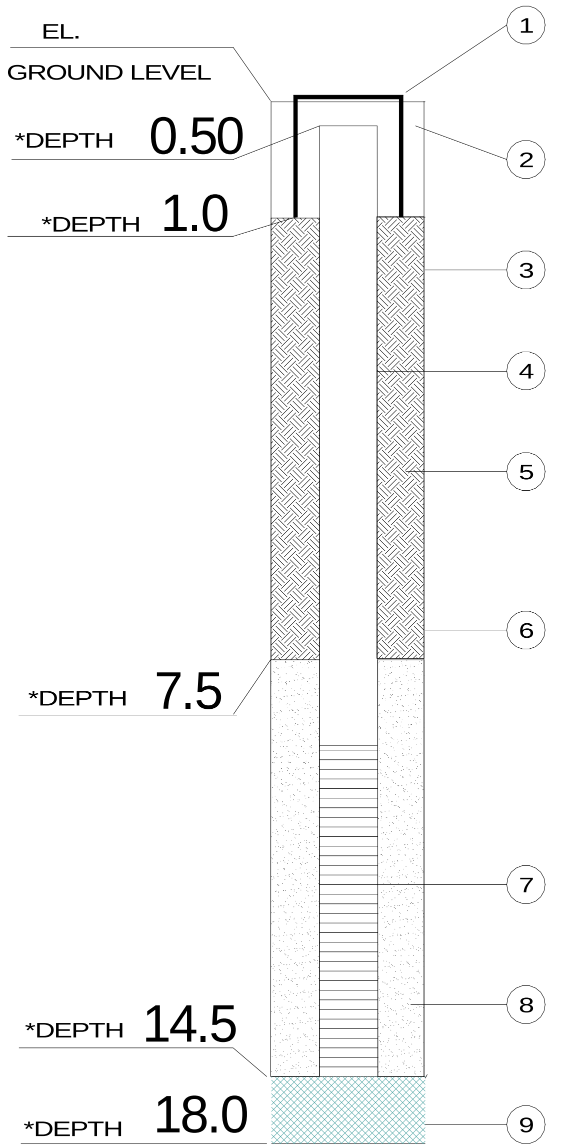
CLIENT: AIMCO	FIELD SCIENTIST: Sarah Webb, L.P.G.
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 12/6/11
PROJECT NAME: Michigan Meadows Apts	DATE FINISHED: 12/6/11
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Earth Exploration	DRILLING EQUIPMENT: Geoprobe 6620
DRILLER: Sam Barthalow	GW DEPTH (OBSERVED): 20.0
BORING LOCATION: E Side of Holt S of Mich	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	MMW-P-14S
15–17	SW-GW				- ; 0.2	50			2" PVC Riser
17–17.5	SP		Fine grained SILTY SAND, poorly graded, brown (10YR 5/3), dense, moist	17.0					
17.5–20	SW		Fine to coarse grained SAND, well graded, brown (10YR 5/3) dense, moist No Recovery 18.0 - 20.0 ft	17.5	0.1 ; -	50			
20–28	SW-GW		SAND and GRAVEL, well graded, brown (10YR 5/3) dense, wet Wet at 20.0 ft No Recovery 23.0 - 24.0 ft	20.0	0.1 ; 0.2 ; - ; 0.2 ; 0.1	75 ; 100			Sand Pack Bentonite Seal Screen (2" Slotted PVC)
28			End of Boring at 28.0 ft	28.0					

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

VAPOR WELL CONSTRUCTION DIAGRAM

WELL NO. MW-1



*DEPTH IN FEET BELOW GROUND LEVEL

1. PROTECTIVE CASING I.D. 8.0 INCHES
2. SURFACE SEAL TYPE Concrete Cement
3. BOREHOLE DIAMETER 7.0 INCHES
4. RISER PIPE:
   - a. Type PVC
   - b. I.D. 1.0 INCHES
   - c. Length 9.0 FEET
   - d. Joint Type Flush Threaded
5. BACKFILL:
   - a. Type Benseal
   - b. Installation Poured
6. TYPE OF SEAL Bentonite
7. SCREEN:
   - a. Type Schedule 40 PVC
   - b. I.D. 1.0 INCHES
   - c. Slot Size 0.02 INCHES
   - d. Length 5.0 FEET
8. SCREEN FILTER TYPE #4 Sand
9. BACKFILL TYPE Bentonite

DATE COMPLETED 4/18/03

DEVELOPMENT METHOD

DRILLING CONTRACTOR ATC

DRILLER Rondel Lattea

RIG TYPE 6600 Geoprobe

GEOLOGIST/FIELD SCIENTIST
Jason Lougheed

WELL CONSTRUCTION DIAGRAM

Michigan Meadows Apt
3800 West Michigan Street
Indianapolis, IN

Project Number: M01046

Drawing File: MW#1.SKF

Date Prepared:

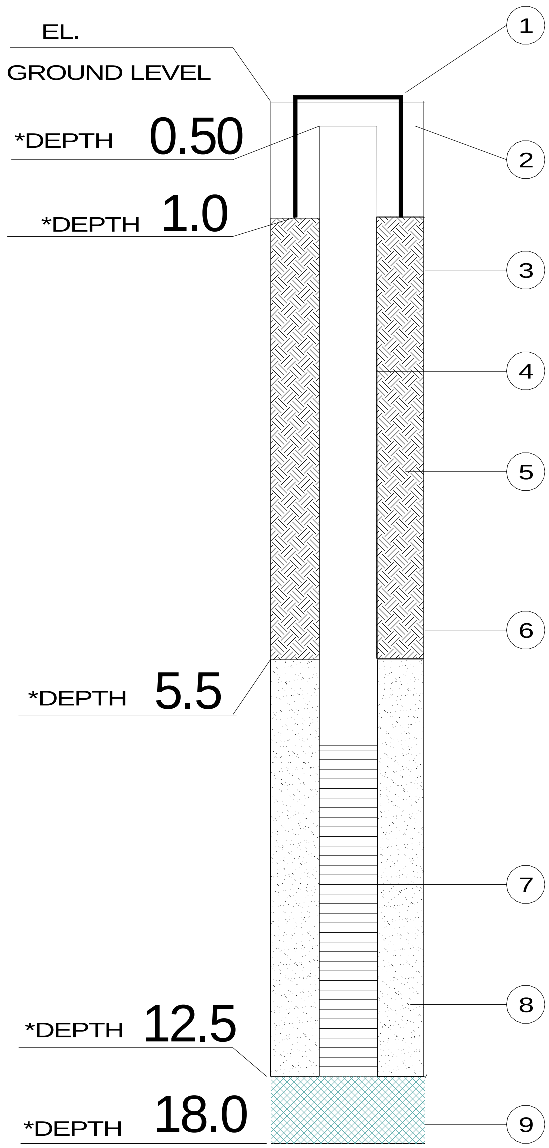
Scale: AS SHOWN

Drn. By: | Ckd. By: | Approved By:

MUNDELL & ASSOCIATES, INC.
429 East Vermont Street, Suite 200
Indianapolis, Indiana 46202-3688

VAPOR WELL CONSTRUCTION DIAGRAM

WELL NO. MW-2



*DEPTH IN FEET BELOW GROUND LEVEL

1. PROTECTIVE CASING I.D. 8.0 INCHES
2. SURFACE SEAL TYPE Concrete Cement
3. BOREHOLE DIAMETER 7.0 INCHES
4. RISER PIPE:
   - a. Type PVC
   - b. I.D. 1.0 INCHES
   - c. Length 7.0 FEET
   - d. Joint Type Flush Threaded
5. BACKFILL:
   - a. Type Benseal
   - b. Installation Poured
6. TYPE OF SEAL Bentonite
7. SCREEN:
   - a. Type Schedule 40 PVC
   - b. I.D. 1.0 INCHES
   - c. Slot Size 0.02 INCHES
   - d. Length 5.0 FEET
8. SCREEN FILTER TYPE #4 Sand
9. BACKFILL TYPE Bentonite

DATE COMPLETED 4/17/03

DEVELOPMENT METHOD

DRILLING CONTRACTOR ATC

DRILLER Rondel Lattea

RIG TYPE 6600 Geoprobe

GEOLOGIST/FIELD SCIENTIST
Jason Lougheed

WELL CONSTRUCTION DIAGRAM

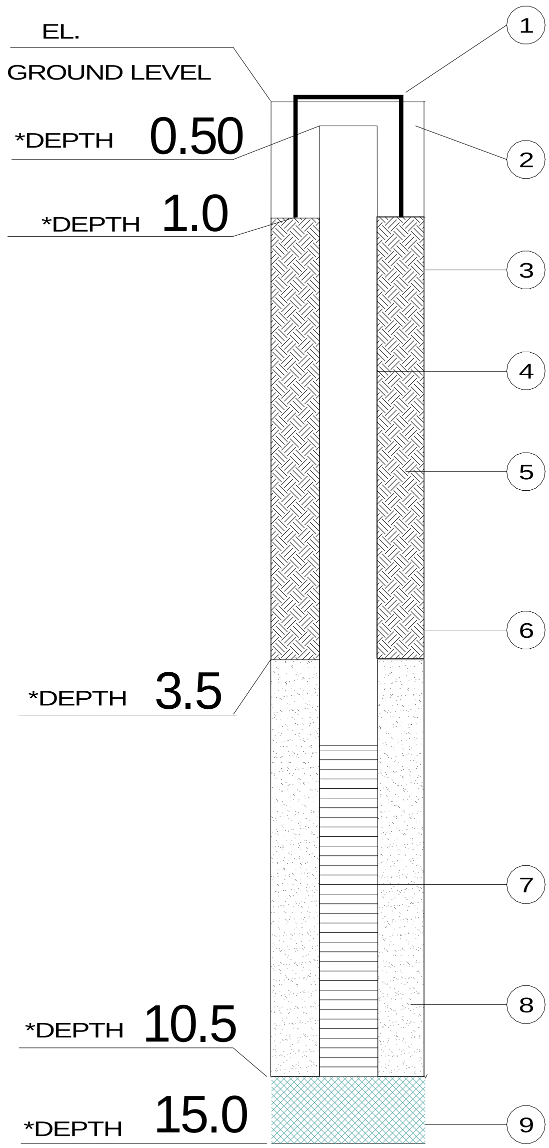
Michigan Meadows Apt
3800 West Michigan Street
Indianapolis, IN

Project Number: M01046	
Drawing File: MW#2.SKF	
Date Prepared:	
Scale: AS SHOWN	
Drn. By:	Ckd. By:	Approved By:

MUNDELL
& ASSOCIATES, INC.
429 East Vermont Street, Suite 200
Indianapolis, Indiana 46202-3688

VAPOR WELL CONSTRUCTION DIAGRAM

WELL NO. MW-3



*DEPTH IN FEET BELOW GROUND LEVEL

1. PROTECTIVE CASING I.D. 8.0 INCHES
2. SURFACE SEAL TYPE Concrete Cement
3. BOREHOLE DIAMETER 7.0 INCHES
4. RISER PIPE:
   a. Type PVC
   b. I.D. 1.0 INCHES
   c. Length 5.0 FEET
   d. Joint Type Flush Threaded
5. BACKFILL:
   a. Type Benseal
   b. Installation Poured
6. TYPE OF SEAL Bentonite
7. SCREEN:
   a. Type Schedule 40 PVC
   b. I.D. 1.0 INCHES
   c. Slot Size 0.02 INCHES
   d. Length 5.0 FEET
8. SCREEN FILTER TYPE #4 Sand
9. BACKFILL TYPE Bentonite

DATE COMPLETED 4/17/03

DEVELOPMENT METHOD

DRILLING CONTRACTOR ATC

DRILLER Rondel Lattea

RIG TYPE 6600 Geoprobe

GEOLOGIST/FIELD SCIENTIST
Jason Lougheed

WELL CONSTRUCTION DIAGRAM

Michigan Meadows Apt
3800 West Michigan Street
Indianapolis, IN

Project Number: M01046

Drawing File: MW#3.SKF

Date Prepared:

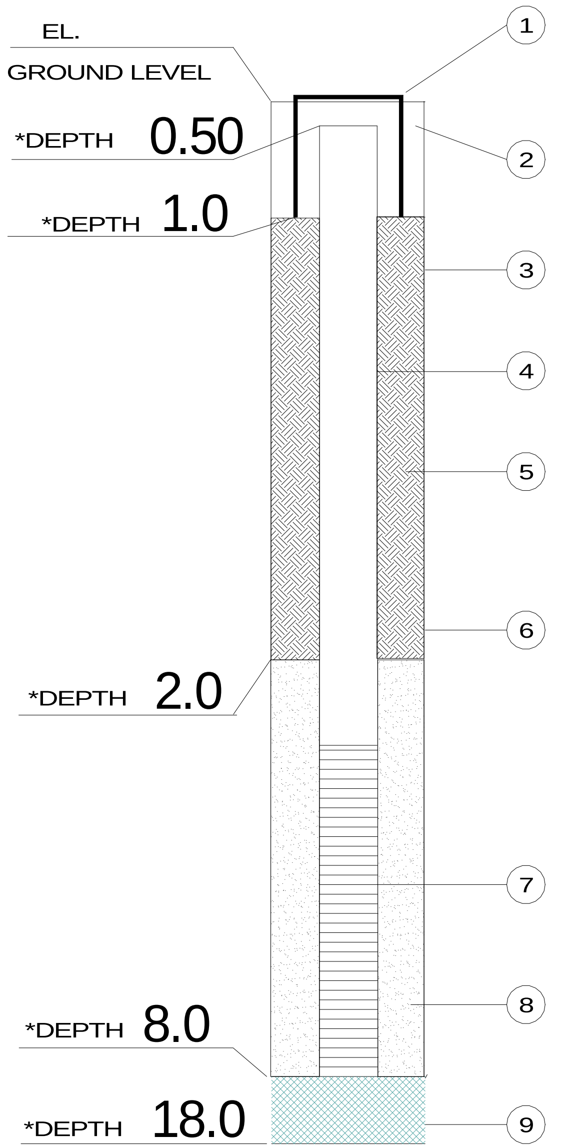
Scale: AS SHOWN

Drn. By: | Ckd. By: | Approved By:

MUNDELL & ASSOCIATES, INC.
429 East Vermont Street, Suite 200
Indianapolis, Indiana 46202-3688

VAPOR WELL CONSTRUCTION DIAGRAM

WELL NO. MW-4



1. PROTECTIVE CASING I.D. 8.0 INCHES
2. SURFACE SEAL TYPE Concrete Cement
3. BOREHOLE DIAMETER 7.0 INCHES
4. RISER PIPE:
   a. Type PVC
   b. I.D. 1.0 INCHES
   c. Length 3.0 FEET
   d. Joint Type Flush Threaded
5. BACKFILL:
   a. Type Benseal
   b. Installation Poured
6. TYPE OF SEAL Bentonite
7. SCREEN:
   a. Type Schedule 40 PVC
   b. I.D. 1.0 INCHES
   c. Slot Size 0.02 INCHES
   d. Length 5.0 FEET
8. SCREEN FILTER TYPE #4 Sand
9. BACKFILL TYPE Bentonite

DATE COMPLETED 4/17/03

DEVELOPMENT METHOD

*DEPTH IN FEET BELOW GROUND LEVEL

DRILLING CONTRACTOR ATC

DRILLER Rondel Lattea

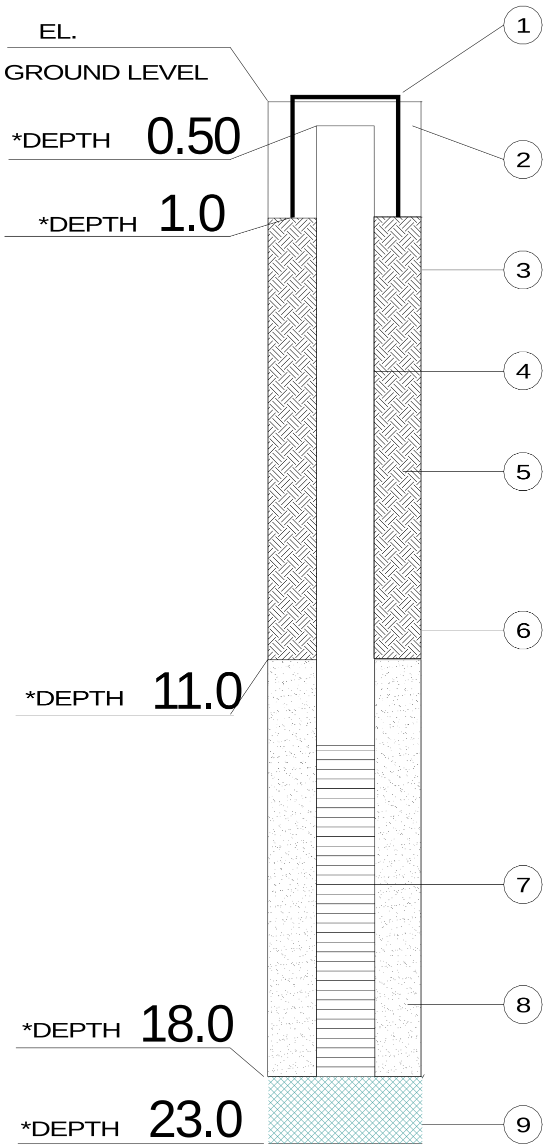
RIG TYPE 6600 Geoprobe

GEOLOGIST/FIELD SCIENTIST
Jason Lougheed

WELL CONSTRUCTION DIAGRAM Michigan Meadows Apt 3800 West Michigan Street Indianapolis, IN	Project Number: M01046 Drawing File: MW#4.SKF Date Prepared: Scale: AS SHOWN Drn. By: | Ckd. By: | Approved By:	MUNDELL & ASSOCIATES, INC. 429 East Vermont Street, Suite 200 Indianapolis, Indiana 46202-3688

VAPOR WELL CONSTRUCTION DIAGRAM

WELL NO. MW-5



*DEPTH IN FEET BELOW GROUND LEVEL

1. PROTECTIVE CASING I.D. 8.0 INCHES
2. SURFACE SEAL TYPE Concrete Cement
3. BOREHOLE DIAMETER 7.0 INCHES
4. RISER PIPE:
   - a. Type PVC
   - b. I.D. 1.0 INCHES
   - c. Length 13.0 FEET
   - d. Joint Type Flush Threaded
5. BACKFILL:
   - a. Type Benseal
   - b. Installation Poured
6. TYPE OF SEAL Bentonite
7. SCREEN:
   - a. Type Schedule 40 PVC
   - b. I.D. 1.0 INCHES
   - c. Slot Size 0.02 INCHES
   - d. Length 5.0 FEET
8. SCREEN FILTER TYPE #4 Sand
9. BACKFILL TYPE Bentonite

DATE COMPLETED 4/18/03

DEVELOPMENT METHOD

DRILLING CONTRACTOR ATC

DRILLER Rondel Lattea

RIG TYPE 6600 Geoprobe

GEOLOGIST/FIELD SCIENTIST Jason Lougheed

WELL CONSTRUCTION DIAGRAM

Michigan Meadows Apt
3800 West Michigan Street
Indianapolis, IN

Project Number: M01046

Drawing File: MW#5.SKF

Date Prepared:

Scale: AS SHOWN

Drn. By: | Ckd. By: | Approved By:

MUNDELL & ASSOCIATES, INC.
429 East Vermont Street, Suite 200
Indianapolis, Indiana 46202-3688

BORING NUMBER: SB-1

MUNDELL & ASSOCIATES — caring for the earth and all it holds

CLIENT: MIDWAY	FIELD GEOLOGIST: LL/AD
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/3/09
PROJECT NAME: Michigan Meadows Appartments	DATE FINISHED: 2/3/09
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: LT-50
DRILLER: Mark / Corrie	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0			GRAVEL						
	CL		SILTY CLAY, SAND, GRAVEL		3.1	25%			
	SW		(10YR 4/4), dry, SAND, fine to coarse grained, no odor	4	0.0	0			
5					5.2				
					5.9				
					9.6 *				* Soil sample from 7-8 ft-bgs submitted for laboratory analysis.
					0.0	0			
					0.0				
10					13.9				
					24.4 *				* Soil sample from 11-12 ft-bgs submitted for laboratory analysis.
					0.0	0			
					0.0				
					26.2 *				* Soil sample from 14-15 ft-bgs submitted for laboratory analysis.
15					23.2				
					0.0	25%			
					0.0				
			Refusal at 19 ft	19	23.9				
20			SP-15 down for the water sample.						
									Water Sample at 23 ft

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

BORING NUMBER: SB-2

CLIENT: AIMCO	FIELD GEOLOGIST: LL/AD
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/3/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/3/09
PROJECT NUMBER: M01046	DRILLING METHOD:
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: LT-50
DRILLER: Mark / Corrie	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0				.2					
0–4			4 Inches of concrete. PEA GRAVEL aprox 2-3" Base course. Possible fill 2 inches. Yellowish brown (10YR 4/4), dry, no odor		2.0	25			
4–7	CL		Dry, SILTY CLAY with trace SAND and GRAVEL,, no odor	7	10.8	55			* Soil sample from 6-7 ft-bgs submitted for laboratory analysis.
7–8			Dark yellowish brown (10YR 4/3), dry, SAND, , fine to coarse grained, no odor		5.6				
8–12					3.6 7.8 6.8	50			* Soil sample from 11-12 ft-bgs submitted for laboratory analysis.
12–16					5.5 8.2	50			* Soil sample from 15-16 ft-bgs submitted for laboratory analysis.
16–20	SW		Slight Yellowish Orange at 19"		7.2 8.8	55			
20–28					7.4 6.5 8.7 9.8 8.8 8.2 9.9 10.1				* Water sample at 23 ft-bgs submitted for laboratory analysis.
28			End of Boring						

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

BORING NUMBER: SB-3

MUNDELL & ASSOCIATES
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CLIENT: AIMCO	FIELD GEOLOGIST: LL/AD
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/3/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/3/09
PROJECT NUMBER: M01046	DRILLING METHOD:
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: LT-50
DRILLER: Mark / Corrie	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0			4 Inches of concrete. GRAVEL: 2-3 inches Possible fill	.2					
	CL		, SILTY CLAY, traces of gravel and sand		8.7	50			* Soil sample from 2-3 ft-bgs submitted for laboratory analysis.
					7.1				
	SW		Dry, SAND, fine grained, traces of gravel, no odor	4					
5					6.4	75			
					7.1				
10					7.6	75			
					8.9				
					9.6				* Soil sample from 11-12 ft-bgs submitted for laboratory analysis.
					9.7	75			
			Orange color at 14-15' 5YR 6/8 (reddish yellow) color		10.9				
15					10.2				* Soil sample from 15-16 ft-bgs submitted for laboratory analysis.
					10.3	75			
					12.9				
					12.6				
20									
					10.5	75			
					8.5				
					8.0				* Water sample at 23 ft-bgs submitted for laboratory analysis.
25									
			End of Boring						
30									

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

BORING NUMBER: SB-4

MUNDELL & ASSOCIATES
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CLIENT: AIMCO	FIELD GEOLOGIST: LL/AD
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/3/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/3/09
PROJECT NUMBER: M01046	DRILLING METHOD:
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: LT-50
DRILLER: Mark / Corrie	GW DEPTH (OBSERVED):
BORING LOCATION: Merridian Street	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)
0–4	CL	4 Inches of concrete. GRAVEL: 3 inches base course Fill: 3 inches of SAND Dark yellowish brown (10YR 4/4), slightly moist (forzen), no odor Dry, SILTY CLAY, traces of sand and gravel, no odor	.4
4–11	SW	GRAVEL at 4 feet Dry, SAND, fine to coarse grained, traces of gravel, no odor Gravel layers from heaving.	4
11–14	SP	Dry, SAND, fine grained, no odor	11
14–28	SW	Dark brown (10YR 3/3), dry, SAND, fine to medium grained, traces of gravel, slight odor	14
28		End of Boring	

Depth interval (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0–1		60			
1–2	0.0				
2–3	0.0				
3–4	2.5				
4–5	0.0	95			
5–6	7.6				
6–7	13.2				* Soil sample from 6-7 ft-bgs submitted for laboratory analysis.
7–8	12.4				
8–9	6.4	70			
9–10	7.9				
10–11	14.9				* Soil sample from 10-11 ft-bgs submitted for laboratory analysis.
11–12	14.2				
12–14					
14–15	18.3				
15–16	21.7	70			
16–17	30.4				* Soil sample from 16-17 ft-bgs submitted for laboratory analysis.
17–18	27.4	90			
18–19	12.5				
19–20	25.3				
20–22		75	27.7		
22–23	28.8				* Water sample at 23 ft-bgs submitted for laboratory analysis.
23–24	14.9				
24–25	18.1	90			
25–26	17.2				
26–27	17.0				
27–28	16.8				

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

09-18-2009 T:\2001\M01046 Michigan Meadows Apts\Boring Logs\Feb 2009\SB (4).bor

BORING NUMBER: SB-5

CLIENT: AIMCO	FIELD GEOLOGIST: LL/AD
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/3/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/3/09
PROJECT NUMBER: M01046	DRILLING METHOD:
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: LT-50
DRILLER: Mark / Corrie	GW DEPTH (OBSERVED):
BORING LOCATION: Laundromat	SURFACE ELEVATION:
	SHEET 1 OF 1

MUNDELL & ASSOCIATES
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Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0			3-4 Inches of concrete.	.4					
			PEA GRAVEL: 2-3 inches						
	CL		(10YR 4/3) SILTY CLAY, traces of sand	4	4.0				* Soil sample from 3-4 ft-bgs submitted for laboratory analysis.
5					2.0				
					3.0				
					3.2				
	SW		(10YR 4/3), dry, SAND, fine to coarse grained, traces of gravel, no odor	7	6.0				
10					13.6				* Soil sample from 9-10 ft-bgs submitted for laboratory analysis.
					10.2				
					10.3				
			Orange color at 18 ft		8.4				
15					9.6				* Soil sample from 15-16 ft-bgs submitted for laboratory analysis.
					13.2				
					13.4				
					7.6				
20					6.4				
					6.5				
					6.5				
					6.5				* Water sample at 23 ft-bgs submitted for laboratory analysis.
					6.5				
25					12.4				
					12.4				
					12.4				
					12.4				
30									
			End of Boring						

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

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BORING NUMBER: SB-6

CLIENT: AIMCO	FIELD GEOLOGIST: LL/AD
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/3/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/3/09
PROJECT NUMBER: M01046	DRILLING METHOD:
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: LT-50
DRILLER: Mark / Corrie	GW DEPTH (OBSERVED):
BORING LOCATION: Laundromat	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0			4 Inches of concrete. PEA GRAVEL: 3 inches. Possible fill 3-4 inches (10YR 4/4), dry, no odor	.4					
	CL		Dry, SILTY CLAY, traces of sand, no odor		2.2				
5	SW		Dry, SAND, fine to coarse grained, no odor	5	3.5				* Soil sample from 5-6 ft-bgs submitted for laboratory analysis.
					2.0				
					2.6				* Soil sample from 7-8 ft-bgs submitted for laboratory analysis.
10	SP		(10YR 4/6), dry, SAND, fine grained, no odor	9	1.7				
					1.8				
	SW		(10YR 4/6), dry, SAND, fine to coarse grained, no odor.	11	2.0				
					3.8				
15			Slight ORANGE color from 15'-16'		6.5				* Soil sample from 14-15 ft-bgs submitted for laboratory analysis.
					2.1				
	SP		(10YR 4/6), dry, SAND, fine grained, no odor	17	5.2				
20	SW			18	6.4				
					7.0				
	SP		Wet	22	7.3				
25	SW			23	8.9				* Water sample at 23 ft-bgs submitted for laboratory analysis.
30			End of Boring						

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

BORING NUMBER: SB-7

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CLIENT: AIMCO	FIELD GEOLOGIST: LL/AD
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/4/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/4/09
PROJECT NUMBER: M01046	DRILLING METHOD: Indoor
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: LT-
DRILLER: Mark / Corrie	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0			4 Inches of concrete. GRAVEL: 3 inches. Gravel base is course. Fil material about 3 inches of sand Dark yellowish brown (10YR 4/4)	.4		NR			
				3	0.0	50			* Soil sample from 3-4 ft-bgs submitted for laboratory analysis.
	CL		SILTY CLAY, Small amounts of SAND and GRAVEL.		3.2				
5						0			
						NR			
10	SW		SAND, fine grained with chunks of rock.	10	1.6	50			* Soil sample from 10-11 ft-bgs submitted for laboratory analysis.
					1.6				
						NR			
15	SW		Yellowish brown (10YR 5/6), SAND, fine grained	15	0.4	50			* Soil sample from 15-16 ft-bgs submitted for laboratory analysis.
					0.3				
						NR			
					0.3	50			
20					0.4				
						75			
					0.6				
	SP		Dark yellowish brown (10YR 3/4), moist, SAND, poorly graded	22	1.8				
	SW		Dark yellowish brown (10YR 3/4), moist, SAND, fine grained	23	1.2				* Water sample at 23 ft-bgs submitted for laboratory analysis.
25						75			
					4.4				
					4.6				
					6.4				
			End of Boring						
30									

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

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BORING NUMBER: SB-8

CLIENT: AIMCO	FIELD GEOLOGIST: LL
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/16/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/16/09
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: GP 6620 DT
DRILLER: Mark / Zach	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0			Asphalt ~ 2 inches	.2					
			Gravel: 6-7 inches base course.	1	NR	25			
			Possible fill: Dark yellowish brown (10YR 4/4), dry, SAND, fine to medium grained, no odor	3					
	CL		Dark gray (10YR 3/1), dry, SILTY CLAY, traces of gravel, traces of sand, no odor. Noticed root fragments.		1.2				
5					4.2	80			* Soil sample from 5-6 ft-bgs submitted for laboratory analysis.
					4.1				
					5.3				
					5.2				
	SW		(2.5Y 6/4), slightly wet, SAND, fine to coarse grained, traces of gravel, no odor. Intermittant black staining 9-10 ft.	8.5	NR	55			
10					5.6				
					5.4				
	SP		(2.5Y 6/4), wet, SAND, fine to medium grained, traces of gravel, no odor	12	8.6	90			* Soil sample from 12-13 ft-bgs submitted for laboratory analysis.
					9.2				
					9.3				
15					9.3				* Soil sample from 15-16 ft-bgs submitted for laboratory analysis.
					NR	75			
					7.0				
					7.1				
					7.1				
20					9.6	60			
					9.2				
					8.2				
					8.2				
			End of Boring	24					* Water sample at 24 ft-bgs submitted for laboratory analysis.
25									

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

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caring for the earth and all it holds

BORING NUMBER: SB-9

CLIENT: AIMCO	FIELD GEOLOGIST: LL
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/16/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/16/09
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: GP 6620 DT
DRILLER: Mark / Zach	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0–4	CL	Asphalt ~ 2 inches Gravel: ~ 4-6 inches Dark gray (10YR 3/1), dry, SILTY CLAY, traces of gravel, medium to coarse grained, no odor	4	NA (0–2), 1.5 (2–3), 1.7 (3–4)	50			
4–11.5	SW	Dark brown (7.5yr 3/4), dry, SAND, medium to coarse grained, traces of gravel, fine to medium grained, no odor Light yellowish brown (2.5y 6/4) at 6.5 ft Gravel/cobble layer at 9 ft SW from 10 ft	11.5	5.0 (4–5), 5.5 (5–6), 6.0 (6–7), 5.2 (7–8), — (8–9), 7.1 (9–10), 5.2 (10–11), 5.2 (11–12)	90 (4–8), 65 (8–12)			* Soil sample from 6-7 ft-bgs submitted for laboratory analysis.
11.5–24	SP	Light yellowish brown (2.5Y 6/4), SAND, fine to medium grained, traces of silt		10.2 (12–13), 8.9 (13–14), 7.2 (14–15), 10.1 (15–16), — (16–17), 7.1 (17–18), 7.2 (18–19), 7.1 (19–20)	90 (12–16), 60 (16–20), NR (20–24)			* Soil sample from 12-13 ft-bgs submitted for laboratory analysis. * Soil sample from 15-16 ft-bgs submitted for laboratory analysis. * Water sample and DUP at 24 ft-bgs submitted for laboratory analysis.
24		End of Boring						

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
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Water Level Observations:
Noted on Rods:
At Completion:

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BORING NUMBER: SB-10

CLIENT: AIMCO	FIELD GEOLOGIST: LL
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/17/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/17/09
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: GP 6620 DT
DRILLER: Mark / Zach	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)
0	CL	~ 3 inches of asphalt	.3
		GRAVEL: possible base course ~ 6 inches.	1
	CL	(10YR 3/4), dry, SILTY CLAY, traces of sand, medium grained, no odor	4
5	SW	(10YR 4/3), dry, SAND, fine to coarse grained, traces of gravel, very fine grained, no odor	10
10	SP	(10YR 4/4), dry, SAND, fine to medium grained, traces of silt, no odor	12
15	SW	(10YR 4/3), SAND, fine to coarse grained, traces of gravel, with some 2.5TR 5/8 color.	18.5
20	SP	(10YR 4/3), wet, SAND, fine grained, no odor	
25		End of Boring	

Depth interval (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0-1		75			
1-2	0.5				
2-3	1.8				
3-4	1.8				
4-5		80			* Soil sample from 4-6 ft-bgs submitted for laboratory analysis.
5-6	3.2				
6-7	2.3				
7-8	2.3				
8-9	10.1	90			* Soil sample from 8-10 ft-bgs submitted for laboratory analysis.
9-10	10.2				
10-11	9.1				
11-12	9.1				
12-13		75			
13-14	7.9				
14-15	9.8				* Soil sample from 14-16 ft-bgs submitted for laboratory analysis.
15-16	9.8				
16-17	9.8	80			
17-18	9.4				
18-19	10.1				
19-20	10.1				
20-24					* Water sample at 24 ft-bgs submitted for laboratory analysis.

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
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USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

Boring/Well ID: SB-100

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/6/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/6/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 16 ft
BORING LOCATION:	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments
0			Fill brick, clay, rock					
1	AR				0.0			
2								
3			CLAYEY SILT, brown (10YR 5/3), soft, moist, slightly plastic	3.0	0.0			H.A. to 4'
4								
5					0.0			
6	SC					87.5		
7					0.2			
8			Fine to medium grained SAND with trace coarse gravels, yellowish brown (10YR 5/4), moist, dense	8.0				
9					0.25		S	8-10'
10						50		
11					NR			
12	SW							
13					0.10			
14						50		
15					NR			
16			Wet below 16.0'					
17			CLAYEY SILT, gray (10YR 6/1), dense, soft, wet	17.1	0.15			
18	SC					85		
19					0.15			
20	SW		Fine to coarse grained SAND, well graded, wet, dark gray (10YR 4/1) loose, trace gravel	20.0				
21			Fine SAND, poorly graded, moist, dense, dark gray (10YR 4/1), loose	21.3	0.05			
22	SP					100		
23					0.25			
24								

SB-100

2" Dia. Borehole

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

NR = Not Recorded

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Boring/Well ID: SB-100

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/6/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/6/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 16 ft
BORING LOCATION:	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	SB-100
24–25.6	SP			25.6	0.2	87.5			
25.6–30.1	SW		Fine to coarse grained SAND, well graded, gray (10YR 6/1), wet, loose	30.1	0.2, 0.3	87.5, 100			2" Dia. Borehole
30.1–32.9	SW		SAND with fine to coarse grained granules and trace cobbles, gray (10YR 5/1), loose, wet	32.9	0.5	100			
32.9–36	CL		CLAY, very stiff, gray (10YR 5/1) slightly moist		0.2, 0.2	100	S	32-34'	

End of boring at 36.0'

Depth scale: 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48

REMARKS:
BGS = Below Ground Surface
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TPV = Total Photoionizable Vapors
NS = Not Surveyed
NR = Not Recorded

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Boring/Well ID: SB-101

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CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/6/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/6/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 16.7
BORING LOCATION:	SURFACE ELEVATION: NS
	SHEET 1 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments
0–4	AR		Fill: brick, clay, rock	4.0	NS (0–4)	100 (0–4)		H.A. to 4'
4–9	CL		SILTY CLAY, very dark gray, (10YR 3/1), very stiff, slightly moist Color change to brown below 8'	9.0	0.7 (4–6) 0.0 (6–8)	87.5 (4–8)		
9–13.9	SW		Fine to medium grained SAND with some fine granules, brown (10YR 5/3), moist, dense	13.9	0.65 (8–10) 0.05 (10–12) 0.9 (12–14)	50 (8–12) 50 (12–16)		
13.9–16.7	SM		SANDY SILT, pale brown (10YR 6/2), very moist, very dense	16.7	0.9 (14–16)		S (14–16)	14-16'
16.7–23.5	SW		Fine to coarse grained SAND, grayish brown (10YR 5/2), wet, dense, non-plastic	23.5	0.05 (16–18) 0.0 (18–20) 0.15 (20–22) 0.25 (22–24)	85 (16–20) 100 (20–24)		
23.5–24	SW-GW		fine to coarse SAND and GRANULES, gray (10YR 6/1), wet, loose, non-plastic					

SB-101

2" Dia. Borehole

REMARKS:
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TPV = Total Photoionizable Vapors
NS = Not Surveyed

NR = Not Recorded
H.A. = Hand Auger

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Boring/Well ID: SB-101

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/6/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/6/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 16.7
BORING LOCATION:	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	SB-101
24								
25	SW-GW			0.0				
26	SW	Fine to medium grained SAND, gray (10YR 5/1) wet, medium dense	25.8		87.5			
27				0.95		S	26-28'	
28	SC-GW	CLAYEY SAND and GRANULES, gray (10YR 5/1), wet	28.0					
29				0.1				
30					100			
31				NR				
32								
33	CL	SILTY CLAY, gray (10YR 5/1), very stiff, slightly moist	32.7	0.25				
34					100			2" Dia. Borehole
35	SW	Fine to medium grained SAND, wet, grayish brown (10YR 5/2), loose, non-plastic	35.1	0.5				
36	SW-GW	fine to coarse SAND and GRANULES, fine to coarse grained, wet, grayish brown (10YR 5/2)	36.0					
37				0.9				
38					100			
39				1.6				
40		Less gravel below 40 ft						
41				3.0				
42					100			
43				2.3				
44		End of boring at 44.0'	44.0					
45								
46								
47								
48								

REMARKS:
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NS = Not Surveyed

NR = Not Recorded
H.A. = Hand Auger

Boring/Well ID: SB-102

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/7/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/7/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 16 ft
BORING LOCATION:	SURFACE ELEVATION: NS

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	SB-102
0		Soil	0.5					
1–4	CL	SANDY CLAY, yellowish brown (10YR 5/6), moist, soft, plastic Dark grayish brown below 4.0'	4.7	0.15	100		H.A. to 4 ft	
5–7	SP	Fine SAND, yellowish brown (10YR 5/6), slightly moist, loose, non-plastic	8.0	0.25 NR	42.5			
8–11	SC	CLAYEY SAND with fine to coarse grained GRANULES, brownish yellow (10YR 6/6), slightly moist, medium dense, non-plastic	12.0	0.1 NR	35			2" Dia. Borehole
12	ML	CLAYEY SILT, grayish brown (10YR 5/2), moist, soft, plastic	12.4					
13–15	SP	Fine grained SAND, light gray (10YR 7/1), slightly moist, medium dense, non-plastic Fine to medium grains below 13.0'	16.0	0.25 0.2	60	S	12-14'	
16–24	SW	Fine to coarse grained SAND with some fine to coarse GRANULES, grayish brown (10YR 5/2), wet, medium dense, non-plastic Fine to medium grained sand with trace granules		0.2 0.3 0.8 1.05	67.5 100			

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

NR = Not Recorded
H.A. = Hand Auger

Boring/Well ID: SB-102

CLIENT: AMMH	FIELD SCIENTIST: Mark Breting
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/7/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/7/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 16 ft
BORING LOCATION:	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	SB-102
24	SW			24.2					
25–28	SW		Fine to coarse grained SAND with fine to coarse GRANULES, gray (10YR 6/1), wet, loose, non-plastic		0.65 / 0.55	57.5			2" Dia. Borehole
28			End of boring at 28.0'						

Depth scale: 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed
NR = Not Recorded
H.A. = Hand Auger

Boring/Well ID: SB-103

CLIENT: AMMH	FIELD SCIENTIST: Gabriel Hebert
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/8/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/8/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 18 ft
BORING LOCATION:	SURFACE ELEVATION: NS

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments	SB-103
0	FB		ASPHALT/SUBBASE	0.3					
1	SW		FILL: fine to medium SAND, dark yellowish brown (10YR 4/4), with fine to coarse granules, dry		2.8				
2						100		H.A. to 4'	
3					2.5				
4									
5	SW		fine to coarse SAND, light yellowish brown (10YR 6/4), dry, loose	5.0	4.1		S	4-6'	
6						75			
7					0.15				
8									
9					0.9				
10						50			
11					0.5				
12									2" Dia. Borehole
13					0.4				
14						50			
15					0.4				
16	CL		SANDY CLAY, grayish brown (10YR 5/2), moist, soft	16.0					
16.5	SW		fine to coarse SAND, yellowish brown (10YR 5/4), slightly moist, with some fine to coarse granules	16.5					
17					0.4		S	16-18'	
18						50			
19			wet below 18 ft		0.2				
20									
21			color change to gray (10YR 5/1) below 21 ft		0.25				
22						100			
23					0.25				
24									

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed

NR = Not Recorded
H.A. = Hand Auger

Boring/Well ID: SB-103

CLIENT: AMMH	FIELD SCIENTIST: Gabriel Hebert
PROJECT LOCATION: Indianapolis, Indiana	DATE BEGAN: 3/8/2013
PROJECT NAME: Michigan Plaza	DATE FINISHED: 3/8/2013
PROJECT NUMBER: M01046	DRILLING METHOD: Geoprobe
DRILLING CONTRACTOR: SCS Environmental	DRILLING EQUIPMENT: 6620 DT
DRILLER: Andy Hermes	GW DEPTH (OBSERVED): 18 ft
BORING LOCATION:	SURFACE ELEVATION: NS
	SHEET 2 OF 2

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Comments
24–25	SW		25.0	1.3	100		
25–36		fine to coarse GRANULES with SAND, gray (10YR 6/1), wet, loose		1.7			
				0.65	100		
				2.0			
				1.85	100		
		increased silt content below 35.5 ft	36.0	2.1		S	34-36'
36–40	CL	SILTY CLAY, gray (10YR 6/1), moist, stiff		0.55	100		
			40.0	0.5			

End of Boring at 40 ft

SB-103: 2" Dia. Borehole

REMARKS:
BGS = Below Ground Surface
USCS = Unified Soil Classification System
TPV = Total Photoionizable Vapors
NS = Not Surveyed
NR = Not Recorded
H.A. = Hand Auger

BORING NUMBER: SB-15

CLIENT: AIMCO	FIELD GEOLOGIST: LL
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/17/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/17/09
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: GP 6620 DT
DRILLER: Mark / Zach	GW DEPTH (OBSERVED):
BORING LOCATION: 20' S-SE of SB-11	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0	CL		~ 3 inches of asphalt	.3					
	SW		Asphalt ~ 3 inches Base course/possible fill 5-6 inches (10YR 4/4), dry, SAND, fine to medium grained, traces of gravel, no odor		13.8 14.8	80			
5	CL		Dark gray (10YR 3/1), SILTY CLAY, traces of sand, no odor	4	30.0 30.0 14.1	80			
10 15 20	SW		SAND, medium to coarse grained, traces of gravel, no odor	7	14.1				
					32.8 29.8	75			
					46.1 45.4	80			
					46.0 46.0	75			
25			End of Boring						

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

BORING NUMBER: SB-16

CLIENT: AIMCO	FIELD GEOLOGIST: LL
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/19/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/19/09
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: GP 6620 DT
DRILLER: Mark / Zach	GW DEPTH (OBSERVED):
BORING LOCATION: E of Bus stop	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0	CL		~ 3 inches of asphalt. Base course 5-6 inches	.3 .5					
	SW		(10YR 4/3), dry, SAND, fine to medium grained, traces of gravel, no odor		2.0	50			
					2.5				
5	CL		Dark gray (10YR 3/1), SILTY CLAY, traces of sand	4	3.6	75			* Soil sample from 4-6 ft-bgs submitted for laboratory analysis.
					3.8				
10	SW		SAND, medium to coarse grained, traces of gravel, slight odor	8	6.5	80			* Soil sample from 8-10 ft-bgs submitted for laboratory analysis.
					11.0				
15					11.1	90			* Soil sample from 12-14 ft-bgs submitted for laboratory analysis.
20					10.8				
25			End of Boring						

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

BORING NUMBER: SB-3

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CLIENT: AIMCO	FIELD GEOLOGIST: LL/AD
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/3/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/3/09
PROJECT NUMBER: M01046	DRILLING METHOD:
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: LT-50
DRILLER: Mark / Corrie	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0			4 Inches of concrete. GRAVEL: 2-3 inches Possible fill	.2		50			
	CL		, SILTY CLAY, traces of gravel and sand		8.7 7.1				* Soil sample from 2-3 ft-bgs submitted for laboratory analysis.
5			Dry, SAND, fine grained, traces of gravel, no odor	4	6.4 7.1	75			
10					7.6 8.9 9.6	75			* Soil sample from 11-12 ft-bgs submitted for laboratory analysis.
15			Orange color at 14-15' 5YR 6/8 (reddish yellow) color		9.7 10.9 10.2	75			* Soil sample from 15-16 ft-bgs submitted for laboratory analysis.
	SW				10.3 12.9 12.6	75			
20					10.5 8.5 8.0	75			* Water sample at 23 ft-bgs submitted for laboratory analysis.
25									
			End of Boring						
30									

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
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USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

BORING NUMBER: SB-4

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CLIENT: AIMCO	FIELD GEOLOGIST: LL/AD
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/3/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/3/09
PROJECT NUMBER: M01046	DRILLING METHOD:
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: LT-50
DRILLER: Mark / Corrie	GW DEPTH (OBSERVED):
BORING LOCATION: Merridian Street	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Locatior	Sample ID	Notes
0		4 Inches of concrete.	.4		60			
1	CL	GRAVEL: 3 inches base course Fill: 3 inches of SAND Dark yellowish brown (10YR 4/4), slightly moist (forzen), no odor		0.0				
2				0.0				
3		Dry, SILTY CLAY, traces of sand and gravel, no odor		2.5				
4	SW	GRAVEL at 4 feet Dry, SAND, fine to coarse grained, traces of gravel, no odor Gravel layers from heaving.	4	0.0	95			
5				7.6				
6				13.2				* Soil sample from 6-7 ft-bgs submitted for laboratory analysis.
7				12.4				
8				6.4	70			
9				7.9				
10				14.9				* Soil sample from 10-11 ft-bgs submitted for laboratory analysis.
11	SP	Dry, SAND, fine grained, no odor	11	14.2				
12								
13								
14	SW	Dark brown (10YR 3/3), dry, SAND, fine to medium grained, traces of gravel, slight odor	14	18.3				
15				21.7	70			
16				30.4				* Soil sample from 16-17 ft-bgs submitted for laboratory analysis.
17				27.4	90			
18				12.5				
19				25.3				
20					75	27.7		
21								
22				28.8				* Water sample at 23 ft-bgs submitted for laboratory analysis.
23				14.9				
24				18.1	90			
25				17.2				
26				17.0				
27				16.8				
28		End of Boring						
30								

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

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BORING NUMBER: SB-5

CLIENT: AIMCO	FIELD GEOLOGIST: LL/AD
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/3/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/3/09
PROJECT NUMBER: M01046	DRILLING METHOD:
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: LT-50
DRILLER: Mark / Corrie	GW DEPTH (OBSERVED):
BORING LOCATION: Laundromat	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0			3-4 Inches of concrete.	.4					
			PEA GRAVEL: 2-3 inches						
	CL		(10YR 4/3) SILTY CLAY, traces of sand	4	4.0				* Soil sample from 3-4 ft-bgs submitted for laboratory analysis.
5					2.0				
					3.0				
					3.2				
	SW		(10YR 4/3), dry, SAND, fine to coarse grained, traces of gravel, no odor	7	6.0				
10					13.6				* Soil sample from 9-10 ft-bgs submitted for laboratory analysis.
					10.2				
					10.3				
			Orange color at 18 ft		8.4				
15					9.6				* Soil sample from 15-16 ft-bgs submitted for laboratory analysis.
					13.2				
					13.4				
					7.6				
20					6.4				
					6.5				
					6.5				
					6.5				* Water sample at 23 ft-bgs submitted for laboratory analysis.
					6.5				
25					12.4				
					12.4				
					12.4				
					12.4				
30									
			End of Boring						

TPV = Total Photo-Ionization Vapors
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PPM = Parts Per Million
BGS = Below Ground Surface
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Water Level Observations:
Noted on Rods:
At Completion:

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BORING NUMBER: SB-6			

CLIENT: AIMCO	FIELD GEOLOGIST: LL/AD
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/3/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/3/09
PROJECT NUMBER: M01046	DRILLING METHOD:
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: LT-50
DRILLER: Mark / Corrie	GW DEPTH (OBSERVED):
BORING LOCATION: Laundromat	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0	CL		4 Inches of concrete. PEA GRAVEL: 3 inches. Possible fill 3-4 inches (10YR 4/4), dry, no odor Dry, SILTY CLAY, traces of sand, no odor	.4	2.2				
5	SW		Dry, SAND, fine to coarse grained, no odor	5	3.5 2.0 2.6				* Soil sample from 5-6 ft-bgs submitted for laboratory analysis. * Soil sample from 7-8 ft-bgs submitted for laboratory analysis.
10	SP		(10YR 4/6), dry, SAND, fine grained, no odor	9	1.7 1.8				
15	SW		(10YR 4/6), dry, SAND, fine to coarse grained, no odor. Slight ORANGE color from 15'-16'	11	2.0 3.8 6.5 2.1				* Soil sample from 14-15 ft-bgs submitted for laboratory analysis.
	SP		(10YR 4/6), dry, SAND, fine grained, no odor	17	5.2				
20	SW			18	6.4 7.0				
	SP		Wet	22	7.3				
25	SW			23	8.9				* Water sample at 23 ft-bgs submitted for laboratory analysis.
30			End of Boring						

TPV = Total Photo-Ionization Vapors
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PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

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BORING NUMBER: SB-7

CLIENT: AIMCO	FIELD GEOLOGIST: LL/AD
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/4/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/4/09
PROJECT NUMBER: M01046	DRILLING METHOD: Indoor
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: LT-
DRILLER: Mark / Corrie	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0			4 Inches of concrete. GRAVEL: 3 inches. Gravel base is course. Fil material about 3 inches of sand Dark yellowish brown (10YR 4/4)	.4		NR			
					0.0	50			
	CL		SILTY CLAY, Small amounts of SAND and GRAVEL.	3	3.2				* Soil sample from 3-4 ft-bgs submitted for laboratory analysis.
5						0			
						NR			
10	SW		SAND, fine grained with chunks of rock.	10	1.6	50			* Soil sample from 10-11 ft-bgs submitted for laboratory analysis.
					1.6				
						NR			
					0.4	50			
15	SW		Yellowish brown (10YR 5/6), SAND, fine grained	15	0.3				* Soil sample from 15-16 ft-bgs submitted for laboratory analysis.
						NR			
					0.3	50			
					0.4				
20						75			
					0.6				
	SP		Dark yellowish brown (10YR 3/4), moist, SAND, poorly graded	22	1.8				
	SW		Dark yellowish brown (10YR 3/4), moist, SAND, fine grained	23	1.2				* Water sample at 23 ft-bgs submitted for laboratory analysis.
25						75			
					4.4				
					4.6				
					6.4				
			End of Boring						
30									

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

BORING NUMBER: SB-8

CLIENT: AIMCO	FIELD GEOLOGIST: LL
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/16/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/16/09
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: GP 6620 DT
DRILLER: Mark / Zach	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0			Asphalt ~ 2 inches	.2	NR	25			
			Gravel: 6-7 inches base course.	1					
			Possible fill: Dark yellowish brown (10YR 4/4), dry, SAND, fine to medium grained, no odor	3	1.2				
5	CL		Dark gray (10YR 3/1), dry, SILTY CLAY, traces of gravel, traces of sand, no odor. Noticed root fragments.	8.5	4.2, 4.1, 5.3, 5.2	80			* Soil sample from 5-6 ft-bgs submitted for laboratory analysis.
10	SW		(2.5Y 6/4), slightly wet, SAND, fine to coarse grained, traces of gravel, no odor. Intermittant black staining 9-10 ft.	12	NR, 5.6, 5.4	55			
15, 20	SP		(2.5Y 6/4), wet, SAND, fine to medium grained, traces of gravel, no odor		8.6, 9.2, 9.3, 9.3	90			* Soil sample from 12-13 ft-bgs submitted for laboratory analysis. * Soil sample from 15-16 ft-bgs submitted for laboratory analysis.
					NR, 7.0, 7.1, 7.1	75			
					9.6, 9.2, 8.2, 8.2	60			
25			End of Boring						* Water sample at 24 ft-bgs submitted for laboratory analysis.

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

BORING NUMBER: SB-8

CLIENT: AIMCO	FIELD GEOLOGIST: LL
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/16/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/16/09
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: GP 6620 DT
DRILLER: Mark / Zach	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0	CL		Asphalt ~ 2 inches Gravel: ~ 4-6 inches Dark gray (10YR 3/1), dry, SILTY CLAY, traces of gravel, medium to coarse grained, no odor	4	NA 1.5 1.7 5.0	50			
5	SW		Dark brown (7.5yr 3/4), dry, SAND, medium to coarse grained, traces of gravel, fine to medium grained, no odor Light yellowish brown (2.5y 6/4) at 6.5 ft Gravel/cobble layer at 9 ft SW from 10 ft	11.5	5.5 6.0 5.2 7.1 5.2 5.2	90 65			* Soil sample from 6-7 ft-bgs submitted for laboratory analysis.
10									
15	SP		Light yellowish brown (2.5Y 6/4), SAND, fine to medium grained, traces of silt		10.2 8.9 7.2 10.1 7.1 7.2 7.1	90 60 NR			* Soil sample from 12-13 ft-bgs submitted for laboratory analysis. * Soil sample from 15-16 ft-bgs submitted for laboratory analysis. * Water sample and DUP at 24 ft-bgs submitted for laboratory analysis.
20									
25			End of Boring						

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

BORING NUMBER: SB-10

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CLIENT: AIMCO	FIELD GEOLOGIST: LL
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/17/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/17/09
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: GP 6620 DT
DRILLER: Mark / Zach	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0	CI		~ 3 inches of asphalt	.3		75			
			GRAVEL: possible base course ~ 6 inches.	1	0.5				
	CL		(10YR 3/4), dry, SILTY CLAY, traces of sand, medium grained, no odor		1.8				
					1.8				
5	SW		(10YR 4/3), dry, SAND, fine to coarse grained, traces of gravel, very fine grained, no odor	4		80			* Soil sample from 4-6 ft-bgs submitted for laboratory analysis.
					3.2				
					2.3				
					2.3				
					10.1	90			* Soil sample from 8-10 ft-bgs submitted for laboratory analysis.
					10.2				
10	SP		(10YR 4/4), dry, SAND, fine to medium grained, traces of silt, no odor	10	9.1				
					9.1				
15	SW		(10YR 4/3), SAND, fine to coarse grained, traces of gravel, with some 2.5TR 5/8 color.	12		75			* Soil sample from 14-16 ft-bgs submitted for laboratory analysis.
					7.9				
					9.8				
					9.8				
					9.8	80			
					9.4				
20	SP		(10YR 4/3), wet, SAND, fine grained, no odor	18.5	10.1				
					10.1				* Water sample at 24 ft-bgs submitted for laboratory analysis.
25			End of Boring						

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

BORING NUMBER: SB-15

MUNDELL & ASSOCIATES
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CLIENT: AIMCO	FIELD GEOLOGIST: LL
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/17/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/17/09
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: GP 6620 DT
DRILLER: Mark / Zach	GW DEPTH (OBSERVED):
BORING LOCATION: 20' S-SE of SB-11	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0	CL		~ 3 inches of asphalt	.3	13.8	80			
	SW		Asphalt ~ 3 inches Base course/possible fill 5-6 inches (10YR 4/4), dry, SAND, fine to medium grained, traces of gravel, no odor		14.8				
5	CL		Dark gray (10YR 3/1), SILTY CLAY, traces of sand, no odor	4	30.0 30.0 14.1	80			
	SW		SAND, medium to coarse grained, traces of gravel, no odor	7	14.1				
10					32.8 29.8	75			
15	SW				46.1 45.4	80			
20					46.0 46.0	75			
25			End of Boring						

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

BORING NUMBER: SB-17

MUNDELL & ASSOCIATES
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CLIENT: AIMCO	FIELD GEOLOGIST: LL
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN:
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED:
PROJECT NUMBER: M01046	DRILLING METHOD:
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT:
DRILLER:	GW DEPTH (OBSERVED):
BORING LOCATION: E of Bus stop	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0			Grass ~ 2 inches	.3					
	CL		(7.5YR 6/3), SILTY CLAY, traces of gravel, traces of sand, slight odor	1	2.7				
					3.2				* Soil sample from 4-6 ft-bgs submitted for laboratory analysis.
5					6.9				
					6.4				
					16.5				
10	SW		(2.5Y 7/2), SAND, fine to medium grained, traces of gravel	10	73.2				* Soil sample from 10-12 ft-bgs submitted for laboratory analysis.
					102				* Soil sample from 12-14 ft-bgs submitted for laboratory analysis.
15					125				
20			End of Boring						

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PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

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BORING NUMBER: SB-3

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CLIENT: AIMCO	FIELD GEOLOGIST: LL/AD
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/3/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/3/09
PROJECT NUMBER: M01046	DRILLING METHOD:
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: LT-50
DRILLER: Mark / Corrie	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0			4 Inches of concrete. GRAVEL: 2-3 inches Possible fill	.2		50			
	CL		, SILTY CLAY, traces of gravel and sand		8.7 7.1				* Soil sample from 2-3 ft-bgs submitted for laboratory analysis.
5			Dry, SAND, fine grained, traces of gravel, no odor	4	6.4 7.1	75			
10					7.6 8.9 9.6	75			* Soil sample from 11-12 ft-bgs submitted for laboratory analysis.
15	SW		Orange color at 14-15' 5YR 6/8 (reddish yellow) color		9.7 10.9 10.2	75			* Soil sample from 15-16 ft-bgs submitted for laboratory analysis.
20					10.3 12.9 12.6	75			
					10.5 8.5 8.0	75			* Water sample at 23 ft-bgs submitted for laboratory analysis.
25									
			End of Boring						
30									

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

BORING NUMBER: SB-4

CLIENT: AIMCO	FIELD GEOLOGIST: LL/AD
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/3/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/3/09
PROJECT NUMBER: M01046	DRILLING METHOD:
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: LT-50
DRILLER: Mark / Corrie	GW DEPTH (OBSERVED):
BORING LOCATION: Merridian Street	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	Recovery %	Notes
0–0.4		4 Inches of concrete.	.4	60	
0.4–4	CL	GRAVEL: 3 inches base course Fill: 3 inches of SAND Dark yellowish brown (10YR 4/4), slightly moist (forzen), no odor Dry, SILTY CLAY, traces of sand and gravel, no odor	4		
4–11	SW	GRAVEL at 4 feet Dry, SAND, fine to coarse grained, traces of gravel, no odor Gravel layers from heaving.	11	95 (4–8); 70 (8–12)	* Soil sample from 6-7 ft-bgs submitted for laboratory analysis. * Soil sample from 10-11 ft-bgs submitted for laboratory analysis.
11–14	SP	Dry, SAND, fine grained, no odor	14		
14–28	SW	Dark brown (10YR 3/3), dry, SAND, fine to medium grained, traces of gravel, slight odor		70 (15–17); 90 (17–20); 75 (20–24); 90 (24–28)	* Soil sample from 16-17 ft-bgs submitted for laboratory analysis. * Water sample at 23 ft-bgs submitted for laboratory analysis.
28		End of Boring			

Depth interval (ft)	TPV (ppm)	Sample Location
0–1		
1–2	0.0	
2–3	0.0	
3–4	2.5	
4–5	0.0	
5–6	7.6	
6–7	13.2	
7–8	12.4	
8–9	6.4	
9–10	7.9	
10–11	14.9	
11–12	14.2	
12–14		
14–15	18.3	
15–16	21.7	
16–17	30.4	
17–18	27.4	
18–19	12.5	
19–20	25.3	
20–22		27.7
22–23	28.8	
23–24	14.9	
24–25	18.1	
25–26	17.2	
26–27	17.0	
27–28	16.8	

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

BORING NUMBER: SB-5

CLIENT: AIMCO	FIELD GEOLOGIST: LL/AD
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/3/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/3/09
PROJECT NUMBER: M01046	DRILLING METHOD:
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: LT-50
DRILLER: Mark / Corrie	GW DEPTH (OBSERVED):
BORING LOCATION: Laundromat	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0			3-4 Inches of concrete.	.4					
			PEA GRAVEL: 2-3 inches						
	CL		(10YR 4/3) SILTY CLAY, traces of sand						
				4	4.0				* Soil sample from 3-4 ft-bgs submitted for laboratory analysis.
5					2.0				
					3.0				
					3.2				
	SW		(10YR 4/3), dry, SAND, fine to coarse grained, traces of gravel, no odor	7	6.0				
					13.6				* Soil sample from 9-10 ft-bgs submitted for laboratory analysis.
10					10.2				
					10.3				
			Orange color at 18 ft		8.4				
					9.6				
15					13.2				* Soil sample from 15-16 ft-bgs submitted for laboratory analysis.
					13.4				
					7.6				
20					6.4				
					6.5				
					6.5				
					6.5				
					6.5				* Water sample at 23 ft-bgs submitted for laboratory analysis.
					12.4				
25					12.4				
					12.4				
					12.4				
30									
			End of Boring						

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

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BORING NUMBER: SB-6

CLIENT: AIMCO	FIELD GEOLOGIST: LL/AD
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/3/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/3/09
PROJECT NUMBER: M01046	DRILLING METHOD:
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: LT-50
DRILLER: Mark / Corrie	GW DEPTH (OBSERVED):
BORING LOCATION: Laundromat	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Locatior	Sample ID	Notes
0	CL		4 Inches of concrete. PEA GRAVEL: 3 inches. Possible fill 3-4 inches (10YR 4/4), dry, no odor Dry, SILTY CLAY, traces of sand, no odor	.4	2.2				
5	SW		Dry, SAND, fine to coarse grained, no odor	5	3.5 2.0 2.6				* Soil sample from 5-6 ft-bgs submitted for laboratory analysis. * Soil sample from 7-8 ft-bgs submitted for laboratory analysis.
10	SP		(10YR 4/6), dry, SAND, fine grained, no odor	9	1.7 1.8				
15	SW		(10YR 4/6), dry, SAND, fine to coarse grained, no odor. Slight ORANGE color from 15'-16'	11	2.0 3.8 6.5 2.1				* Soil sample from 14-15 ft-bgs submitted for laboratory analysis.
	SP		(10YR 4/6), dry, SAND, fine grained, no odor	17	5.2				
20	SW			18	6.4 7.0				
	SP		Wet	22	7.3				
25	SW			23	8.9				* Water sample at 23 ft-bgs submitted for laboratory analysis.
30			End of Boring						

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

BORING NUMBER: SB-7

CLIENT: AIMCO	FIELD GEOLOGIST: LL/AD
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/4/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/4/09
PROJECT NUMBER: M01046	DRILLING METHOD: Indoor
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: LT-
DRILLER: Mark / Corrie	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0			4 Inches of concrete. GRAVEL: 3 inches. Gravel base is course. Fil material about 3 inches of sand Dark yellowish brown (10YR 4/4)	.4		NR			
					0.0				
				3	3.2	50			* Soil sample from 3-4 ft-bgs submitted for laboratory analysis.
5	CL		SILTY CLAY, Small amounts of SAND and GRAVEL.			0			
						NR			
10	SW		SAND, fine grained with chunks of rock.	10	1.6	50			* Soil sample from 10-11 ft-bgs submitted for laboratory analysis.
					1.6				
						NR			
					0.4				
15	SW		Yellowish brown (10YR 5/6), SAND, fine grained	15	0.3	50			* Soil sample from 15-16 ft-bgs submitted for laboratory analysis.
						NR			
					0.3	50			
20					0.4				
					0.6	75			
	SP		Dark yellowish brown (10YR 3/4), moist, SAND, poorly graded	22	1.8				
	SW		Dark yellowish brown (10YR 3/4), moist, SAND, fine grained	23	1.2				* Water sample at 23 ft-bgs submitted for laboratory analysis.
25					4.4	75			
					4.6				
					6.4				
			End of Boring						
30									

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

BORING NUMBER: SB-8

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CLIENT: AIMCO	FIELD GEOLOGIST: LL
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/16/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/16/09
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: GP 6620 DT
DRILLER: Mark / Zach	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0		Asphalt ~ 2 inches	.2	NR	25			
		Gravel: 6-7 inches base course.	1					
		Possible fill: Dark yellowish brown (10YR 4/4), dry, SAND, fine to medium grained, no odor						
	CL	Dark gray (10YR 3/1), dry, SILTY CLAY, traces of gravel, traces of sand, no odor. Noticed root fragments.	3	1.2				
				4.2	80			
5				4.1				* Soil sample from 5-6 ft-bgs submitted for laboratory analysis.
				5.3				
				5.2				
	SW	(2.5Y 6/4), slightly wet, SAND, fine to coarse grained, traces of gravel, no odor. Intermittant black staining 9-10 ft.	8.5	NR	55			
10				5.6				
				5.4				
	SP	(2.5Y 6/4), wet, SAND, fine to medium grained, traces of gravel, no odor	12	8.6	90			* Soil sample from 12-13 ft-bgs submitted for laboratory analysis.
				9.2				
				9.3				
15				9.3				* Soil sample from 15-16 ft-bgs submitted for laboratory analysis.
				NR	75			
				7.0				
				7.1				
				7.1				
20				9.6	60			
				9.2				
				8.2				
				8.2				
		End of Boring						* Water sample at 24 ft-bgs submitted for laboratory analysis.
25								

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

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BORING NUMBER: SB-8

MUNDELL & ASSOCIATES
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CLIENT: AIMCO	FIELD GEOLOGIST: LL
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/16/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/16/09
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: GP 6620 DT
DRILLER: Mark / Zach	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0	CL		Asphalt ~ 2 inches Gravel: ~ 4-6 inches Dark gray (10YR 3/1), dry, SILTY CLAY, traces of gravel, medium to coarse grained, no odor	4	NA 1.5 1.7	50			
5	SW		Dark brown (7.5yr 3/4), dry, SAND, medium to coarse grained, traces of gravel, fine to medium grained, no odor Light yellowish brown (2.5y 6/4) at 6.5 ft		5.0 5.5 6.0 5.2	90			* Soil sample from 6-7 ft-bgs submitted for laboratory analysis.
10			Gravel/cobble layer at 9 ft SW from 10 ft	11.5	 7.1 5.2 5.2	65			
15	SP		Light yellowish brown (2.5Y 6/4), SAND, fine to medium grained, traces of silt		10.2 8.9 7.2 10.1	90			* Soil sample from 12-13 ft-bgs submitted for laboratory analysis. * Soil sample from 15-16 ft-bgs submitted for laboratory analysis.
20					 7.1 7.2 7.1	60			
						NR			* Water sample and DUP at 24 ft-bgs submitted for laboratory analysis.
25			End of Boring						

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

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BORING NUMBER: SB-10

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CLIENT: AIMCO	FIELD GEOLOGIST: LL
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/17/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/17/09
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: GP 6620 DT
DRILLER: Mark / Zach	GW DEPTH (OBSERVED):
BORING LOCATION:	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0	CI		~ 3 inches of asphalt	.3					
			GRAVEL: possible base course ~ 6 inches.	1					
	CL		(10YR 3/4), dry, SILTY CLAY, traces of sand, medium grained, no odor		0.5, 1.8, 1.8	75			
5	SW		(10YR 4/3), dry, SAND, fine to coarse grained, traces of gravel, very fine grained, no odor	4	3.2, 2.3, 2.3	80			* Soil sample from 4-6 ft-bgs submitted for laboratory analysis.
					10.1, 10.2				* Soil sample from 8-10 ft-bgs submitted for laboratory analysis.
10	SP		(10YR 4/4), dry, SAND, fine to medium grained, traces of silt, no odor	10	9.1, 9.1	90			
15	SW		(10YR 4/3), SAND, fine to coarse grained, traces of gravel, with some 2.5TR 5/8 color.	12	7.9, 9.8, 9.8	75			* Soil sample from 14-16 ft-bgs submitted for laboratory analysis.
					9.8, 9.4				
20	SP		(10YR 4/3), wet, SAND, fine grained, no odor	18.5	10.1, 10.1	80			* Water sample at 24 ft-bgs submitted for laboratory analysis.
25			End of Boring						

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

BORING NUMBER: SB-15

MUNDELL & ASSOCIATES
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CLIENT: AIMCO	FIELD GEOLOGIST: LL
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/17/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/17/09
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: GP 6620 DT
DRILLER: Mark / Zach	GW DEPTH (OBSERVED):
BORING LOCATION: 20' S-SE of SB-11	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Location	Sample ID	Notes
0	CI		~ 3 inches of asphalt	.3	13.8	80			
	SW		Asphalt ~ 3 inches Base course/possible fill 5-6 inches (10YR 4/4), dry, SAND, fine to medium grained, traces of gravel, no odor		14.8				
5	CL		Dark gray (10YR 3/1), SILTY CLAY, traces of sand, no odor	4	30.0 30.0 14.1	80			
	SW		SAND, medium to coarse grained, traces of gravel, no odor	7	14.1				
10					32.8 29.8	75			
15	SW				46.1 45.4	80			
20					46.0 46.0	75			
25			End of Boring						

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

BORING NUMBER: SB-16

MUNDELL & ASSOCIATES
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CLIENT: AIMCO	FIELD GEOLOGIST: LL
PROJECT LOCATION: Indianapolis, IN	DATE BEGAN: 2/19/09
PROJECT NAME: Michigan Meadows Apartments	DATE FINISHED: 2/19/09
PROJECT NUMBER: M01046	DRILLING METHOD: Direct Push
DRILLING CONTRACTOR: Midway	DRILLING EQUIPMENT: GP 6620 DT
DRILLER: Mark / Zach	GW DEPTH (OBSERVED):
BORING LOCATION: E of Bus stop	SURFACE ELEVATION:
	SHEET 1 OF 1

Depth BGS (ft)	USCS Symbol	USCS Graphic	Lithologic Description	Stratum Depth (ft)	TPV (ppm)	Recovery %	Sample Locatior	Sample ID	Notes
0	CL		~ 3 inches of asphalt. Base course 5-6 inches	.3 .5					
	SW		(10YR 4/3), dry, SAND, fine to medium grained, traces of gravel, no odor		2.0	50			
					2.5				
5	CL		Dark gray (10YR 3/1), SILTY CLAY, traces of sand	4	3.6	75			* Soil sample from 4-6 ft-bgs submitted for laboratory analysis.
					3.8				
10	SW		SAND, medium to coarse grained, traces of gravel, slight odor	8	6.5	80			* Soil sample from 8-10 ft-bgs submitted for laboratory analysis.
					11.0				
					11.1	90			* Soil sample from 12-14 ft-bgs submitted for laboratory analysis.
15					10.8				
20									
25			End of Boring						

TPV = Total Photo-Ionization Vapors
TFV = Total Flame-Ionization Vapors
PPM = Parts Per Million
BGS = Below Ground Surface
USCS = United Soil Classification System

Water Level Observations:
Noted on Rods:
At Completion:

APPENDIX F

CAP18® INJECTION LOGS

1ST INJECTION (2007) AND 2ND INJECTION (2009)

TABLE F1.
SUMMARY OF TOTAL CAP18^{TM} INJECTION VOLUME
FOR 2007 and 2009 EVENTS
Michigan Plaza, Indianapolis, Indiana

2007 TOTAL Injection Quantity = 6,506 gallons

- ***Source Area A**:* 1,962 gallons CAP 18^{TM} over 8 days of field time.
  - ~ 245 gallons per day.
- ***Source Area B**:* 2,815 gallons CAP 18^{TM} over 12 days of field time.
  - ~ 235 gallons per day.
- ***Source Area C**:* 1,729 gallons CAP 18^{TM} over 5 days of field time.
  - ~ 346 gallons per day.

2009 TOTAL Injection Quantity = 1,884 gallons

- ***Source Area A**:* 455 gallons CAP 18 ME^{TM} over 2 days of field time.
  - ~ 228 gallons per day.
- ***Source Area B**:* 585 gallons CAP 18 ME^{TM} over 2 days of field time.
  - ~ 293 gallons per day.
- ***Source Area C**:* 844 gallons CAP 18 ME^{TM} over 2 days field time.
  - ~ 422 gallons per day.

Average Injection Rate Range = 0.38 to 0.70 gallons per minute (gpm)*****

*Based on a 10-hour workdays on each of the injections days; this represents an average rate of more than one order of magnitude less than a small, low-flowing garden hose (3/4 in diameter), which is typically rated at about 10 gpm.

Table F2
CAP18 Injection Data
August 1 - September 4, 2007
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, IN
Mundell Project # M01046

Injection Point	Date of Injection	Depth of Boring (ft)	Depth of Clay till (ft)	Injection Depth Range (ft)	Total Amt CAP18 Injected (gallons)
Source Area A:					
A1	8/16/07	39	39	17-38	22.0
A2	8/16/07	37	37	15-36	22.0
A3	8/16/07	39	NA	17-38	22.0
A4	8/17/07	42	42	17-41	22.0
A5	8/17/07	43	43	15-42	22.0
A6	8/17/07	42	42	17-41	22.0
A7	8/17/07	44	44	16-43	22.0
A8	8/17/07	44	44	16-43	22.0
A9	8/17/07	40	40	15-39	22.0
A10	8/17/07	39	NA	17-38	22.0
A11	8/17/07	43	43	15-42	22.0
A12	8/20/07	52	52	15-51	22.5
A13	8/20/07	34	34	15-33	22.0
A14	8/20/07	36	36	17-35	22.0
A15	8/20/07	36	36	17-35	22.0
A16	8/20/07	36	36	17-35	22.0
A17	8/21/07	39	39	17-38	66.0
A18	8/21/07	36	36	17-35	66.0
A19	8/21/07	36	36	17-35	66.5
A20	8/21/07	39	39	17-38	66.0
A21	8/21/07	36	36	17-35	66.5
A22	8/22/07	38	38	16-37	66.0
A23	8/22/07	39	39	17-38	66.0
A24	8/22/07	37	37	15-36	66.0
A25	8/22/07	36	36	17-35	66.5
A26	8/22/07	36	36	17-35	66.5
A27	8/23/07	36	36	17-35	66.5
A28	8/23/07	35	35	16-34	66.0
A29	8/23/07	36	36	17-35	66.5
A30	8/23/07	35	35	16-34	66.0
A31	8/23/07	35	35	16-34	66.0
A32	8/24/07	32	30	16-31	66.0
A33	8/24/07	34	34	15-33	66.0
A34	8/24/07	32	32	15-31	22.0
A35	8/24/07	34	34	15-33	22.0
A36	8/24/07	34	34	15-33	66.0
A37	8/24/07	32	32	16-31	66.0
A38	8/24/07	32	32	15-31	22.0
A39	9/4/07	36	NA	17-35	55.0
A40	9/4/07	36	NA	17-35	55.0
A41	9/4/07	36	NA	17-35	55.0

Table F2
CAP18 Injection Data
August 1 - September 4, 2007
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, IN
Mundell Project # M01046

Injection Point	Date of Injection	Depth of Boring (ft)	Depth of Clay till (ft)	Injection Depth Range (ft)	Total Amt CAP18 Injected (gallons)
Source Area B:					
B1	8/1/07	46	38	15-45.5	44.6
B2	8/1/07	42	NA	14.5-41.5	47.2
B3	8/2/07	45	39	14-44	44.2
B4	8/2/07	42	40	14-41	44.4
B5	8/2/07	40	39	15-39	44.0
B6	8/2/07	42	40	17-41	45.0
B7	8/3/07	38	38	16-37	66.5
B8	8/3/07	38	38	16-37	66.5
B9	8/3/07	32	31	17-31	22.0
B10	8/3/07	28	24	15-27	65.0
B11	8/6/07	30	30	17-29	22.0
B12	8/6/07	32	31	16-31	67.0
B13	8/6/07	32	31	16-31	22.0
B14	8/6/07	32	31	16-31	67.0
B15	8/6/07	21	21	16-20	22.0
B16	8/6/07	27	27	17-26	64.0
B17	8/7/07	31	31	15-30	22.0
B18	8/7/07	27	27	17-26	66.0
B19	8/7/07	35	33	15-33	22.0
B20	8/7/07	39	38	17-38	65.5
B21	8/8/07	38	38	16-37	66.3
B22	8/8/07	38	38	16-37	66.3
B23	8/8/07	37	37	15-36	66.3
B24	8/8/07	34	34	15-33	66.0
B25	8/8/07	38	38	15-36	88.5
B26	8/9/07	35	35	16-34	66.0
B27	8/9/07	31	31	15-30	66.0
B28	8/9/07	36	35	17-35	89.0
B29	8/9/07	36	35	16-34	66.0
B30	8/9/07	35	35	16-34	66.0
B31	8/10/07	35	35	16-34	22.5
B32	8/10/07	36	36	17-35	66.0
B33	8/10/07	34	34	15-33	66.0
B34	8/10/07	35	35	16-34	22.0
B35	8/10/07	36	34	17-35	66.0
B36	8/13/07	37	37	15-36	22.0
B37	8/13/07	37	37	15-36	22.0
B38	8/13/07	36	36	17-35	22.0
B39	8/13/07	39	39	17-38	22.0
B40	8/13/07	39	39	17-38	22.0
B41	8/13/07	38	38	16-37	22.0
B42	8/13/07	38	38	16-37	22.0
B43	8/13/07	39	39	17-38	22.0
B44	8/13/07	35	35	16-34	66.0
B45	8/14/07	40	40	15-39	66.0
B46	8/14/07	38	38	16-37	66.5
B47	8/14/07	37	37	15-36	66.5
B48	8/14/07	36	36	17-35	22.0
B49	8/15/07	36	NA	17-35	22.0
B50	8/15/07	34	34	15-33	22.0
B51	8/15/07	35	35	16-34	22.0
B52	8/15/07	37	37	15-36	22.0
B53	8/15/07	36	36	17-35	22.0
B54	8/15/07	35	35	16-34	22.0
B55	8/15/07	36	36	17-35	22.0
B56	8/15/07	40	NA	15-39	58.0

Table F2
CAP18 Injection Data
August 1 - September 4, 2007
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, IN
Mundell Project # M01046

Injection Point	Date of Injection	Depth of Boring (ft)	Depth of Clay till (ft)	Injection Depth Range (ft)	Total Amt CAP18 Injected (gallons)
B57	8/16/07	37	37	15-36	22.0
B58	8/16/07	36	36	17-35	22.0
B59	8/16/07	37	37	15-36	22.0
B60	8/16/07	35	35	16-34	22.0

Table F2
CAP18 Injection Data
August 1 - September 4, 2007
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, IN
Mundell Project # M01046

Injection Point	Date of Injection	Depth of Boring (ft)	Depth of Clay till (ft)	Injection Depth Range (ft)	Total Amt CAP18 Injected (gallons)
Source Area C:					
C1	8/27/07	32	32	16-31	66.0
C2	8/27/07	31	31	15-30	66.0
C3	8/27/07	32	32	16-31	66.0
C4	8/27/07	32	NA	16-31	66.0
C5	8/27/07	34	34	15-33	66.0
C6	8/27/07	32	NA	16-31	66.0
C7	8/27/07	34	34	15-33	52.0
C8	8/28/07	34	34	15-33	52.0
C9	8/28/07	36	NA	17-35	52.0
C10	8/28/07	34	NA	15-33	52.0
C11	8/28/07	36	NA	17-35	52.0
C12	8/28/07	35	NA	16-34	52.0
C13	8/28/07	31	NA	15-30	52.0
C14	8/29/07	32	32	16-31	52.0
C15	8/29/07	35	35	16-34	52.0
C16	8/29/07	32	32	16-31	52.0
C17	8/29/07	32	32	16-31	52.0
C18	8/29/07	32	32	16-31	52.0
C19	8/29/07	34	34	15-33	52.0
C20	8/29/07	34	34	15-33	52.0
C21	8/30/07	30	NA	17-29	17.3
C22	8/30/07	32	32	16-31	17.5
C23	8/30/07	31	NA	15-30	17.3
C24	8/30/07	32	NA	16-31	17.5
C25	8/30/07	32	NA	16-31	17.3
C26	8/30/07	34	NA	15-33	52.0
C27	8/30/07	34	NA	15-33	17.5
C28	8/30/07	34	NA	15-33	17.3
C29	8/30/07	30	30	17-29	52.0
C30	8/31/07	35	35	16-34	17.5
C31	8/31/07	36	NA	17-35	17.3
C32	8/31/07	33	NA	17-32	17.5
C33	8/31/07	31	31	15-30	52.0
C34	8/31/07	31	31	15-30	17.3
C35	8/31/07	31	31	15-30	17.5
C36	8/31/07	35	35	16-34	17.3
C37	8/31/07	32	NA	16-31	17.5
C38	8/31/07	31	31	15-30	52.0
C39	8/31/07	NA	NA	NA	17.3
C40	9/4/07	32	NA	16-31	30.0

Table F3
CAP18 Injection Data
February 4-12, 2009
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, IN
Mundell Project # M01046

Injection Point	Date of Injection	Depth of Boring (ft)	Depth of Clay till (ft)	Injection Depth Range (ft)	Total Amt CAP18 Injected (gallons)
Source Area B:					
B-1	2/9/09	38	38	20-38	65.0
B-2	2/9/09	38	38	20-38	65.0
B3	2/9/09	35	35	20-35	65.0
B-4	2/9/09	38	38	20-38	65.0
B-5	2/9/09	38	38	20-38	65.0
B-6	2/10/09	39	39	20-38	65.0
B-7	2/10/09	38	38	20-38	65.0
B-8	2/9/09	38	38	20-38	65.0
B-9	2/10/09	38	38	20-38	65.0
Source Area C:					
C-1	2/11/09	40	40	22-40	65.0
C-2	2/11/09	36	36	15-36	65.0
C-3	2/11/09	36	36	15-36	64.0
C-4	2/11/09	36	36	15-36	65.0
C-5	2/11/09	36	36	15-36	65.0
C-6	2/12/09	36	36	15-36	65.0
C-7	2/12/09	36	36	15-36	65.0
C-8	2/12/09	36	36	15-36	65.0
C-9	2/12/09	36	36	15-36	65.0
C-10	2/12/09	36	36	15-36	65.0
C-11	2/12/09	36	36	15-36	65.0
C-12	2/12/09	36	36	15-36	65.0
C-13	2/12/09	36	36	15-36	65.0
Soil Borings:					
SB-1	2/4/09	32	32	20-32	64.0
SB-2	2/4/09	32	32	20-32	64.0
SB-3	2/5/09	32	32	20-32	67.0
SB-4	2/5/09	32	32	20-32	67.0
SB-5	2/5/09	32	32	20-32	65.0
SB-6	2/5/09	32	32	20-32	65.0
SB-7	2/5/09	32	32	20-32	65.0

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: B-1

CLIENT: AIMCO	**DATE BEGAN: 2/9/2009 (10:00AM)**
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED: 2/9/2009 (10:33 AM)**
PROJECT NAME: Michigan Meadows Apartments	**DRILLING MEATHOD: Direct Push**
PROJECT NO: M01046	**DRILL EQUIP: Geoprobe**
DRILLING CONTRACTOR: Midway Services, Inc.	**GW Depth (OBSERVED):**
DRILLER: Mark Hicks	**DEPTH OF BORING: 38ft.**
BORING LOCATION: Source Area B (Parking Lot of Michigan Plaza)	**SURFACE ELEVATION: N/A**
FIELD SCIENTIST: LL/AD/	**TOP OF CASING ELEVATION: N/A**

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is Asphalt.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15		
		16		
		17		
		18		
		19		
		20	11	
		21		
		22		
		23	11	
		24		
		25		
		26	11	
		27		
		28		
		29	11	
		30		
		31		
		32	11	
		33		
		34		
		35	5	
		36		
		37		
		38	5	Total 65 Gallons
		39		
		40		
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	**Sampling Methods:**	**Notes:**
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	Page _1_ of ____.

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: _B-2_

CLIENT: AIMCO	**DATE BEGAN: 2/9/2009 (10:40 AM)**
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED: 2/9/2009 (11:50 AM)**
PROJECT NAME: Michigan Meadows Apartments	**DRILLING MEATHOD: Direct Push**
PROJECT NO: M01046	**DRILL EQUIP: Geoprobe**
DRILLING CONTRACTOR: Midway Services, Inc.	**GW Depth (OBSERVED):**
DRILLER: Mark Hicks	**DEPTH OF BORING: 38ft.**
BORING LOCATION: Source Area B (Parking Lot of Michigan Plaza)	**SURFACE ELEVATION: N/A**
FIELD SCIENTIST: LL/AD/	**TOP OF CASING ELEVATION: N/A**

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is Asphalt.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15		
		16		
		17		
		18		
		19		
		20	11	
		21		
		22		
		23	11	
		24		
		25		
		26	11	
		27		
		28		
		29	11	
		30		
		31		
		32	11	
		33		
		34		
		35	5	
		36		
		37		
		38	5	Total 65 Gallons
		39		
		40		
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	**Sampling Methods:**	**Notes:**
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: B-3

CLIENT: AIMCO	**DATE BEGAN: 2/9/2009 (12:05 PM)**
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED: 2/9/2009 (1:12 PM)**
PROJECT NAME: Michigan Meadows Apartments	**DRILLING MEATHOD: Direct Push**
PROJECT NO: M01046	**DRILL EQUIP: Geoprobe**
DRILLING CONTRACTOR: Midway Services, Inc.	**GW Depth (OBSERVED):**
DRILLER: Mark Hicks	**DEPTH OF BORING: 35ft.**
BORING LOCATION: Source Area B (Parking Lot of Michigan Plaza)	**SURFACE ELEVATION: N/A**
FIELD SCIENTIST: LL/AD/	**TOP OF CASING ELEVATION: N/A**

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is Asphalt.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15		
		16		
		17		
		18		
		19		
		20	12	
		21		
		22		
		23	12	
		24		
		25		
		26	12	
		27		
		28		
		29	12	
		30		
		31		
		32	12	
		33		
		34		
		35	5	
		36		hardpan encountered at 35'
		37		began injections accordingly
		38		Total 65 Gallons
		39		
		40		
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	**Sampling Methods:**	**Notes:**
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: B-4

CLIENT: AIMCO	**DATE BEGAN: 2/9/2009 (2:30 PM)**
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED: 2/9/2009 (3:25 PM)**
PROJECT NAME: Michigan Meadows Apartments	**DRILLING MEATHOD: Direct Push**
PROJECT NO: M01046	**DRILL EQUIP: Geoprobe**
DRILLING CONTRACTOR: Midway Services, Inc.	**GW Depth (OBSERVED):**
DRILLER: Mark Hicks	**DEPTH OF BORING: 38ft.**
BORING LOCATION: Source Area B (Parking Lot of Michigan Plaza)	**SURFACE ELEVATION: N/A**
FIELD SCIENTIST: LL/AD/	**TOP OF CASING ELEVATION: N/A**

GEOLOGIC DESCRIPTION	STRATUM DEPTH, ft	DEPTH FT	GALLONS INJECTED PER INTERVAL	COMMENTS
Ground surface is Asphalt.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15		
		16		
		17		
		18		
		19		
		20	11	
		21		
		22		
		23	11	
		24		
		25		
		26	11	
		27		
		28		
		29	11	
		30		
		31		
		32	11	
		33		
		34		
		35	5	
		36		
		37		
		38	5	Total 65 Gallons
		39		
		40		Hardpan encountered at 40'
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	Sampling Methods:	Notes:
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	Page 1 of ____.

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: B-5

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows Apartments
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks and Zach
BORING LOCATION: Source Area B (Michigan Plaza Parking Lot)
FIELD SCIENTIST: LL/AD/

DATE BEGAN: 2/9/2009 (15:35)
DATE FINISHED: 2/9/2009 (17:00)
DRILLING MEATHOD: Direct Push
DRILL EQUIP: Geoprobe
GW Depth (OBSERVED):
DEPTH OF BORING: 38ft.
SURFACE ELEVATION: N/A
TOP OF CASING ELEVATION: N/A

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is Asphalt.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15		
		16		
		17		
		18		
		19		
		20	11	
		21		
		22		
		23	11	
		24		
		25		
		26	11	
		27		
		28		
		29	11	
		30		
		31		
		32	11	
		33		
		34		
		35	5	
		36		
		37		
		38	5	Total 65 Gallons
		39		
		40		
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	**Sampling Methods:**	**Notes:**
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	Page _1_ of ____.

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: B-6

CLIENT: AIMCO	**DATE BEGAN: 2/10/2009 (8:45)**
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED: 2/10/2009 (10:05)**
PROJECT NAME: Michigan Meadows Apartments	**DRILLING MEATHOD: Direct Push**
PROJECT NO: M01046	**DRILL EQUIP: Geoprobe**
DRILLING CONTRACTOR: Midway Services, Inc.	**GW Depth (OBSERVED):**
DRILLER: Mark Hicks and Zach	**DEPTH OF BORING: 39ft.**
BORING LOCATION: Source Area B (Michigan Plaza Parking Lot)	**SURFACE ELEVATION: N/A**
FIELD SCIENTIST: LL/AD/	**TOP OF CASING ELEVATION: N/A**

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is Asphalt.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15		
		16		
		17		
		18		
		19		
		20	11	
		21		
		22		
		23	11	
		24		
		25		
		26	11	
		27		
		28		
		29	11	
		30		
		31		
		32	11	
		33		
		34		
		35	5	
		36		
		37		
		38	5	Total 65 Gallons
		39		
		40		Two hard ubits encountered here: one at 32'; the other at 39'
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	**Sampling Methods:**	**Notes:**
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: B-7

CLIENT: AIMCO	**DATE BEGAN: 2/10/2009 (10:10)**
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED: 2/10/2009 (11:35)**
PROJECT NAME: Michigan Meadows Apartments	**DRILLING MEATHOD: Direct Push**
PROJECT NO: M01046	**DRILL EQUIP: Geoprobe**
DRILLING CONTRACTOR: Midway Services, Inc.	**GW Depth (OBSERVED):**
DRILLER: Mark Hicks and Zach	**DEPTH OF BORING: 38ft.**
BORING LOCATION: Source Area B (Michigan Plaza Parking Lot)	**SURFACE ELEVATION: N/A**
FIELD SCIENTIST: LL/AD/	**TOP OF CASING ELEVATION: N/A**

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is Asphalt.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15		
		16		
		17		
		18		
		19		
		20	11	
		21		
		22		
		23	11	
		24		
		25		
		26	11	
		27		
		28		
		29	11	
		30		
		31		
		32	11	
		33		
		34		
		35	5	
		36		
		37		
		38	5	Total 65 Gallons
		39		
		40		Hard pan at 38'
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	**Sampling Methods:**	**Notes:**
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	Page 1 of ____.

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: B-8

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows Apartments
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: Source Area B (Parking Lot of Michigan Plaza)
FIELD SCIENTIST: LL/AD/

DATE BEGAN: 2/9/2009 (2:30 PM)
DATE FINISHED: 2/9/2009 (3:25 PM)
DRILLING MEATHOD: Direct Push
DRILL EQUIP: Geoprobe
GW Depth (OBSERVED):
DEPTH OF BORING: 38ft.
SURFACE ELEVATION: N/A
TOP OF CASING ELEVATION: N/A

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is Asphalt.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15		
		16		
		17		
		18		
		19		
		20	11	
		21		
		22		
		23	11	
		24		
		25		
		26	11	
		27		
		28		
		29	11	
		30		
		31		
		32	11	
		33		
		34		
		35	5	
		36		
		37		
		38	5	Total 65 Gallons
		39		
		40		Pump for CAP-18 went out
		41		1:35 P Mark working to get it fixed
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	Sampling Methods:	Notes:
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	Page 1 of ____.

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: B-9

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows Apartments
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: Source Area B (Parking Lot of Michigan Plaza)
FIELD SCIENTIST: LL/AD/

DATE BEGAN: 2/10/2009 (2:45 PM)
DATE FINISHED: 2/10/2009 (4:00 PM)
DRILLING MEATHOD: Direct Push
DRILL EQUIP: Geoprobe
GW Depth (OBSERVED):
DEPTH OF BORING: 38ft.
SURFACE ELEVATION: N/A
TOP OF CASING ELEVATION: N/A

GEOLOGIC DESCRIPTION	STRATUM DEPTH, ft	DEPTH FT	GALLONS INJECTED PER INTERVAL	COMMENTS
Ground surface is Asphalt.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15		
		16		
		17		
		18		
		19		
		20	11	
		21		
		22		
		23	11	
		24		
		25		
		26	11	
		27		
		28		
		29	11	
		30		
		31		
		32	11	
		33		
		34		
		35	5	
		36		
		37		
		38	5	Total 65 Gallons
		39		
		40		
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:
Noted on Rods: _________'
At Completion:

Sampling Methods:
LBS - Large Bore Sampler
MBS - Macro Bore Sampler
HSA - Hollow Stem Auger
GEO - Geoprobe

Notes:
TPV - Total Photoionizable Vapors
ND - Not Detected
* - Water Sample(s) Retained for Laboratory Analysis

Page _1_ of ____.

MUNDELL & ASSOCIATES, INC.

FIELD BORING LOG

Injection NO: _C1_

CLIENT: AIMCO	**DATE BEGAN: 2/11/2009 (9:00AM)**
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED: 2/11/2009 (10:15AM)**
PROJECT NAME: Michigan Meadows Apartments	**DRILLING MEATHOD: Direct Push**
PROJECT NO: M01046	**DRILL EQUIP: Geoprobe**
DRILLING CONTRACTOR: Midway Services, Inc.	**GW Depth (OBSERVED):**
DRILLER: Mark Hicks / Zack	**DEPTH OF BORING: 40ft.**
BORING LOCATION: Source Area C (West of Building 1)	**SURFACE ELEVATION: N/A**
FIELD SCIENTIST: LL/AD/	**TOP OF CASING ELEVATION: N/A**

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is grass.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15		
		16		
		17		
		18		
		19		
		20		
		21		
		22	11	
		23		
		24		
		25	11	
		26		
		27		
		28	11	
		29		
		30		
		31	11	
		32		
		33		
		34	11	
		35		
		36		
		37	5	
		38		
		39		
		40	5	Total 65 Gallons
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	**Sampling Methods:**	**Notes:**
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: _C2_

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows Apartments
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks / Zack
BORING LOCATION: Source Area C (West of Building 1)
FIELD SCIENTIST: LL/AD/

DATE BEGAN: 2/11/2009 (10:30AM)
DATE FINISHED: 2/11/2009 (11:45AM)
DRILLING MEATHOD: Direct Push
DRILL EQUIP: Geoprobe
GW Depth (OBSERVED):
DEPTH OF BORING: 36ft.
SURFACE ELEVATION: N/A
TOP OF CASING ELEVATION: N/A

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is Asphalt.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15	10	
		16		
		17		
		18	10	
		19		
		20		
		21	10	
		22		
		23		
		24	10	
		25		
		26		
		27	10	
		28		
		29		
		30	5	
		31		
		32		
		33	5	
		34		
		35		
		36	5	Total of 65 Gallons
		37		
		38		
		39		
		40		
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:
Noted on Rods: _________'
At Completion:

Sampling Methods:
LBS - Large Bore Sampler
MBS - Macro Bore Sampler
HSA - Hollow Stem Auger
GEO - Geoprobe

Notes:
TPV - Total Photoionizable Vapors
ND - Not Detected
* - Water Sample(s) Retained for Laboratory Analysis

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: C-3

CLIENT: AIMCO	**DATE BEGAN: 2/11/2009**
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED: 2/11/2009 (14:15)**
PROJECT NAME: Michigan Meadows Apartments	**DRILLING MEATHOD: Direct Push**
PROJECT NO: M01046	**DRILL EQUIP: Geoprobe**
DRILLING CONTRACTOR: Midway Services, Inc.	**GW Depth (OBSERVED):**
DRILLER: Mark Hicks and Zach	**DEPTH OF BORING: 36ft.**
BORING LOCATION: Source Area C (West of Building 1)	**SURFACE ELEVATION: N/A**
FIELD SCIENTIST: SW	**TOP OF CASING ELEVATION: N/A**

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is Asphalt.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15	11	
		16		
		17		
		18	11	
		19		
		20		
		21	11	
		22		
		23		
		24	11	
		25		
		26		
		27	15	
		28		
		29		
		30	5	
		31		
		32		formation would not accept CAP-18 at these depths (between 30 and 36')
		33	0	~ 5 gallons accepted between 36 and 30 feet
		34		
		35		
		36	0	Total 64 Gallons
		37		
		38		
		39		13:15 Really having trouble here. Injection tip seems to be getting clogged with silt from the formation. Pulled all rods and tip, cleared and cleaned. Reinserted at C-3 location and are trying again for acceptance of CAP-18 by the formation. C-3 completed at 14:15. 64 gallons were injected at this location - formation was very resistant at all intervals, but especially after 29 feet (29-36). Once completed, CAP-18 visible at the top of the borehole.
		40		
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	**Sampling Methods:**	**Notes:**
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	Page _1_ of ____.

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: C-4

CLIENT: AIMCO	**DATE BEGAN: 2/11/2009 (14:30)**
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED: 2/11/2009 (15:20)**
PROJECT NAME: Michigan Meadows Apartments	**DRILLING MEATHOD: Direct Push**
PROJECT NO: M01046	**DRILL EQUIP: Geoprobe**
DRILLING CONTRACTOR: Midway Services, Inc.	**GW Depth (OBSERVED):**
DRILLER: Mark Hicks and Zach	**DEPTH OF BORING: 36ft.**
BORING LOCATION: Source Area C (West of Building 1)	**SURFACE ELEVATION: N/A**
FIELD SCIENTIST: SW	**TOP OF CASING ELEVATION: N/A**

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is Asphalt.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15	10	
		16		
		17		
		18	10	
		19		
		20		
		21	10	
		22		
		23		
		24	10	
		25		
		26		
		27	13	
		28		
		29		
		30	4	
		31		
		32		
		33	4	
		34		
		35		
		36	4	Total 65 Gallons
		37		
		38		
		39		
		40		
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	**Sampling Methods:**	**Notes:**
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	Page 1 of ____.

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: C-5

CLIENT: AIMCO	**DATE BEGAN: 2/11/2009 (15:25)**
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED: 2/11/2009 (16:30)**
PROJECT NAME: Michigan Meadows Apartments	**DRILLING MEATHOD: Direct Push**
PROJECT NO: M01046	**DRILL EQUIP: Geoprobe**
DRILLING CONTRACTOR: Midway Services, Inc.	**GW Depth (OBSERVED):**
DRILLER: Mark Hicks and Zach	**DEPTH OF BORING: 36ft.**
BORING LOCATION: Source Area C (West of Building 1)	**SURFACE ELEVATION: N/A**
FIELD SCIENTIST: SW	**TOP OF CASING ELEVATION: N/A**

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is Asphalt.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15	10	
		16		
		17		
		18	10	
		19		
		20		
		21	10	
		22		
		23		
		24	10	
		25		
		26		
		27	10	
		28		
		29		
		30	5	
		31		
		32		
		33	5	
		34		
		35		
		36	5	Total 65 Gallons
		37		
		38		
		39		
		40		No problems with formation acceptance at this location. All borings filled with bentonite chips and covered in asphalt patch.
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	**Sampling Methods:**	**Notes:**
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: C-6

CLIENT: AIMCO	**DATE BEGAN: 2/12/2009 (9:15)**
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED: 2/12/2009 (10:10)**
PROJECT NAME: Michigan Meadows Apartments	**DRILLING MEATHOD: Direct Push**
PROJECT NO: M01046	**DRILL EQUIP: Geoprobe**
DRILLING CONTRACTOR: Midway Services, Inc.	**GW Depth (OBSERVED):**
DRILLER: Mark Hicks and Zach	**DEPTH OF BORING: 36ft.**
BORING LOCATION: Source Area C (West of Building 1)	**SURFACE ELEVATION: N/A**
FIELD SCIENTIST: SW	**TOP OF CASING ELEVATION: N/A**

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is Asphalt.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15	10	
		16		
		17		
		18	10	
		19		
		20		
		21	10	
		22		
		23		
		24	10	
		25		
		26		
		27	10	
		28		
		29		
		30	5	
		31		
		32		
		33	5	
		34		
		35		
		36	5	Total 65 Gallons
		37		
		38		
		39		
		40		
		41		Probe pushed easily through the entire interval.
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	**Sampling Methods:**	**Notes:**
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	Page _1_ of ____.

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: C-7

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows Apartments
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks and Zach
BORING LOCATION: Source Area C (West of Building 1)
FIELD SCIENTIST: SW

DATE BEGAN: 2/12/2009 (14:00)
DATE FINISHED: 2/12/2009 (15:00)
DRILLING MEATHOD: Direct Push
DRILL EQUIP: Geoprobe
GW Depth (OBSERVED):
DEPTH OF BORING: 36ft.
SURFACE ELEVATION: N/A
TOP OF CASING ELEVATION: N/A

GEOLOGIC DESCRIPTION	STRATUM DEPTH, ft	DEPTH FT	GALLONS INJECTED PER INTERVAL	COMMENTS
Ground surface is asphalt.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15	10	
		16		
		17		
		18	10	
		19		
		20		
		21	10	
		22		
		23		
		24	10	
		25		
		26		
		27	10	
		28		
		29		
		30	5	
		31		
		32		
		33	5	
		34		
		35		
		36	5	Total 65 Gallons
		37		
		38		
		39		
		40		
		41		Formation accepted all CAP-18 with no issues at any interval.
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:
Noted on Rods: _________'
At Completion:

Sampling Methods:
LBS - Large Bore Sampler
MBS - Macro Bore Sampler
HSA - Hollow Stem Auger
GEO - Geoprobe

Notes:
TPV - Total Photoionizable Vapors
ND - Not Detected
* - Water Sample(s) Retained for Laboratory Analysis

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: C-8

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows Apartments
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks and Zach
BORING LOCATION: Source Area C (West of Building 1)
FIELD SCIENTIST: SW

DATE BEGAN: 2/12/2009 (12:45)
DATE FINISHED: 2/12/2009 (13:50)
DRILLING MEATHOD: Direct Push
DRILL EQUIP: Geoprobe
GW Depth (OBSERVED):
DEPTH OF BORING: 36ft.
SURFACE ELEVATION: N/A
TOP OF CASING ELEVATION: N/A

GEOLOGIC DESCRIPTION	STRATUM DEPTH, ft	DEPTH FT	GALLONS INJECTED PER INTERVAL	COMMENTS
Ground surface is asphalt.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15	10	
		16		
		17		
		18	10	
		19		
		20		
		21	10	
		22		
		23		
		24	10	
		25		
		26		
		27	10	
		28		
		29		
		30	5	
		31		
		32		
		33	5	
		34		
		35		
		36	5	Total 65 Gallons
		37		
		38		
		39		
		40		
		41		Formation accepted all CAP-18 with no problems at any interval.
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	Sampling Methods:	Notes:
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	Page 1 of ____.

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: C-10

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows Apartments
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks and Zach
BORING LOCATION: Source Area C (West of Building 1)
FIELD SCIENTIST: SW

DATE BEGAN: 2/12/2009 (11:35)
DATE FINISHED: 2/12/2009 (12:30)
DRILLING MEATHOD: Direct Push
DRILL EQUIP: Geoprobe
GW Depth (OBSERVED):
DEPTH OF BORING: 36ft.
SURFACE ELEVATION: N/A
TOP OF CASING ELEVATION: N/A

GEOLOGIC DESCRIPTION	STRATUM DEPTH, ft	DEPTH FT	GALLONS INJECTED PER INTERVAL	COMMENTS
Ground surface is Grass.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15	10	
		16		
		17		
		18	10	
		19		
		20		
		21	10	
		22		
		23		
		24	10	
		25		
		26		
		27	10	
		28		
		29		
		30	5	
		31		
		32		
		33	5	
		34		
		35		
		36	5	Total 65 Gallons
		37		
		38		
		39		
		40		No difficult intervals encountered. CAP-18 acccepted by the formation without issue.
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	Sampling Methods:	Notes:
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: C-11

CLIENT: AIMCO	**DATE BEGAN: 2/12/2009 (10:15)**
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED: 2/12/2009 (11:25)**
PROJECT NAME: Michigan Meadows Apartments	**DRILLING MEATHOD: Direct Push**
PROJECT NO: M01046	**DRILL EQUIP: Geoprobe**
DRILLING CONTRACTOR: Midway Services, Inc.	**GW Depth (OBSERVED):**
DRILLER: Mark Hicks and Zach	**DEPTH OF BORING: 36ft.**
BORING LOCATION: Source Area C (West of Building 1)	**SURFACE ELEVATION: N/A**
FIELD SCIENTIST: SW	**TOP OF CASING ELEVATION: N/A**

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is Grass.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15	10	
		16		
		17		
		18	10	
		19		
		20		
		21	10	
		22		
		23		
		24	10	
		25		
		26		
		27	10	
		28		
		29		
		30	5	
		31		
		32		
		33	5	
		34		
		35		
		36	5	Total 65 Gallons
		37		
		38		
		39		
		40		No extremely hard intervals encountered in the boring interval (0-36). Formation accepted all CAP-18 with no problems.
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	**Sampling Methods:**	**Notes:**
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	Page _1_ of ____.

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: C-12

CLIENT: AIMCO	**DATE BEGAN: 2/12/2009 (15:10)**
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED: 2/12/2009 (16:00)**
PROJECT NAME: Michigan Meadows Apartments	**DRILLING MEATHOD: Direct Push**
PROJECT NO: M01046	**DRILL EQUIP: Geoprobe**
DRILLING CONTRACTOR: Midway Services, Inc.	**GW Depth (OBSERVED):**
DRILLER: Mark Hicks and Zach	**DEPTH OF BORING: 36ft.**
BORING LOCATION: Source Area C (West of Building 1)	**SURFACE ELEVATION: N/A**
FIELD SCIENTIST: SW	**TOP OF CASING ELEVATION: N/A**

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is grass.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15	10	
		16		
		17		
		18	10	
		19		
		20		
		21	10	
		22		
		23		
		24	10	
		25		
		26		
		27	10	
		28		
		29		
		30	7.5	
		31		
		32	7.5	
		33	0	
		34		
		35		
		36	0	Total 65 Gallons
		37		
		38		
		39		
		40		Probe Encountered hard unit at ~30'. Mark pushed to 36 and attempted CAP-18 injection. The formation would not accept it. Mark pulled up to 33'- stilll could not inject. At 32' we were able to get 7.5 gallons in, also 30'. Smooth sailing after 30'.
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	**Sampling Methods:**	**Notes:**
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	Page 1 of ____.

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: C-13

CLIENT: AIMCO	**DATE BEGAN: 2/12/2009 (16:10)**
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED: 2/12/2009 (17:20)**
PROJECT NAME: Michigan Meadows Apartments	**DRILLING MEATHOD: Direct Push**
PROJECT NO: M01046	**DRILL EQUIP: Geoprobe**
DRILLING CONTRACTOR: Midway Services, Inc.	**GW Depth (OBSERVED):**
DRILLER: Mark Hicks and Zach	**DEPTH OF BORING: 36ft.**
BORING LOCATION: Source Area C (West of Building 1)	**SURFACE ELEVATION: N/A**
FIELD SCIENTIST: SW	**TOP OF CASING ELEVATION: N/A**

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15	10	
		16		
		17		
		18	10	
		19		
		20		
		21	10	
		22		
		23		
		24	10	
		25		
		26		
		27	10	
		28		
		29		
		30	5*	* Difficult Injection
		31		
		32	5*	
		33	0*	
		34		
		35		
		36	5	Total 65 Gallons
		37		
		38		
		39		
		40		Again, hard unit encountered at 30 feet. Pushed through and was able to inject 5 gallons at 36'. 33' would not accept CAP-18 so we pulled up to 32': this depth easilt accepted 5 gallons. 30' resisted injection but we got 5 gallons in despite it.
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	**Sampling Methods:**	**Notes:**
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	Page _1_ of ____.

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: SB-1

CLIENT: AIMCO	**DATE BEGAN: 2/4/2009 (2:47 PM)**
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED: 2/4/2009 (3:50 PM)**
PROJECT NAME: Michigan Meadows Apartments	**DRILLING MEATHOD: Direct Push**
PROJECT NO: M01046	**DRILL EQUIP: Geoprobe**
DRILLING CONTRACTOR: Midway Services, Inc.	**GW Depth (OBSERVED):**
DRILLER: Mark Hicks	**DEPTH OF BORING: 32ft.**
BORING LOCATION: Source Area A (inside Zacateca's)	**SURFACE ELEVATION: N/A**
FIELD SCIENTIST: LL/AD/	**TOP OF CASING ELEVATION: N/A**

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is Asphalt.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15		
		16		
		17		
		18		
		19		
		20	9	
		21		
		22		
		23	15	
		24		
		25		
		26	15	
		27		
		28		
		29	15	
		30		
		31		
		32	10	Total 64 Gallons
		33		
		34		
		35		
		36		
		37		
		38		
		39		
		40		
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	**Sampling Methods:**	**Notes:**
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: _SB-2_

CLIENT: AIMCO	**DATE BEGAN: 2/4/2009 (4:00 PM)**
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED: 2/4/2009 (5:02 PM)**
PROJECT NAME: Michigan Meadows Apartments	**DRILLING MEATHOD: Direct Push**
PROJECT NO: M01046	**DRILL EQUIP: Geoprobe**
DRILLING CONTRACTOR: Midway Services, Inc.	**GW Depth (OBSERVED):**
DRILLER: Mark Hicks	**DEPTH OF BORING: 32ft.**
BORING LOCATION: Source Area A (inside Zacateca's)	**SURFACE ELEVATION: N/A**
FIELD SCIENTIST: LL/AD/	**TOP OF CASING ELEVATION: N/A**

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is Asphalt.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15		
		16		
		17		
		18		
		19		
		20	9	
		21		
		22		
		23	15	
		24		
		25		
		26	15	
		27		
		28		
		29	15	
		30		
		31		
		32	10	Total 64 Gallons
		33		
		34		
		35		
		36		
		37		
		38		
		39		
		40		
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	**Sampling Methods:**	**Notes:**
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	Page _1_ of ____.

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: SB-3

CLIENT: AIMCO	**DATE BEGAN: 2/5/2009 (8:50 AM)**
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED: 2/5/2009**
PROJECT NAME: Michigan Meadows Apartments	**DRILLING MEATHOD: Direct Push**
PROJECT NO: M01046	**DRILL EQUIP: Geoprobe**
DRILLING CONTRACTOR: Midway Services, Inc.	**GW Depth (OBSERVED):**
DRILLER: Mark Hicks	**DEPTH OF BORING: 32ft.**
BORING LOCATION: Source Area A (inside Zacateca's)	**SURFACE ELEVATION: N/A**
FIELD SCIENTIST: LL/AD/	**TOP OF CASING ELEVATION: N/A**

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is Vinyl Tile, Concrete.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15		
		16		
		17		
		18		
		19		
		20	10	
		21		
		22		
		23	16	
		24		
		25		
		26	16	
		27		
		28		
		29	15	
		30		
		31		
		32	10	Total 67 Gallons
		33		
		34		
		35		
		36		
		37		
		38		
		39		
		40		
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	**Sampling Methods:**	**Notes:**
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: _SB-5_

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows Apartments
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: Source Area A (Michigan Plaza Family Laundry)
FIELD SCIENTIST: LL/AD/

DATE BEGAN: 2/5/2009 (3:30 PM)
DATE FINISHED: 2/5/2009 (4:25 PM)
DRILLING MEATHOD: Direct Push
DRILL EQUIP: Geoprobe
GW Depth (OBSERVED):
DEPTH OF BORING: 32ft.
SURFACE ELEVATION: N/A
TOP OF CASING ELEVATION: N/A

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is Concrete.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15		
		16		
		17		
		18		
		19		
		20	10	
		21		
		22		
		23	15	
		24		
		25		
		26	15	
		27		
		28		
		29	15	
		30		
		31		
		32	10	Total 65 Gallons
		33		
		34		
		35		
		36		
		37		
		38		
		39		
		40		
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	**Sampling Methods:**	**Notes:**
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	Page _1_ of ____.

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: SB-6

CLIENT: AIMCO
PROJECT LOCATION: Indianapolis, Indiana
PROJECT NAME: Michigan Meadows Apartments
PROJECT NO: M01046
DRILLING CONTRACTOR: Midway Services, Inc.
DRILLER: Mark Hicks
BORING LOCATION: Source Area A (Michigan Plaza Family Laundry)
FIELD SCIENTIST: LL/AD/

DATE BEGAN: 2/5/2009 (4:30 PM)
DATE FINISHED: 2/5/2009
DRILLING MEATHOD: Direct Push
DRILL EQUIP: Geoprobe
GW Depth (OBSERVED):
DEPTH OF BORING: 32ft.
SURFACE ELEVATION: N/A
TOP OF CASING ELEVATION: N/A

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is Concrete.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15		
		16		
		17		
		18		
		19		
		20	10	
		21		
		22		
		23	15	
		24		
		25		
		26	15	
		27		
		28		
		29	15	
		30		
		31		
		32	10	Total 65 Gallons
		33		
		34		
		35		
		36		
		37		
		38		
		39		
		40		
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:
Noted on Rods: _________'
At Completion:

Sampling Methods:
LBS - Large Bore Sampler
MBS - Macro Bore Sampler
HSA - Hollow Stem Auger
GEO - Geoprobe

Notes:
TPV - Total Photoionizable Vapors
ND - Not Detected
* - Water Sample(s) Retained for Laboratory Analysis

MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: SB-7

CLIENT: AIMCO	**DATE BEGAN: 2/5/2009 (10:05 AM)**
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED: 2/5/2009 (11:00 AM)**
PROJECT NAME: Michigan Meadows Apartments	**DRILLING MEATHOD: Direct Push**
PROJECT NO: M01046	**DRILL EQUIP: Geoprobe**
DRILLING CONTRACTOR: Midway Services, Inc.	**GW Depth (OBSERVED):**
DRILLER: Mark Hicks	**DEPTH OF BORING: 32ft.**
BORING LOCATION: Source Area A (Inside Zacateca's)	**SURFACE ELEVATION: N/A**
FIELD SCIENTIST: LL/AD/	**TOP OF CASING ELEVATION: N/A**

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is Vinyl Tile, Concrete.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15		
		16		
		17		
		18		
		19		
		20	10	
		21		
		22		
		23	15	
		24		
		25		
		26	15	
		27		
		28		
		29	15	
		30		
		31		
		32	10	Total 65 Gallons
		33		
		34		4 drums and 25 gallons (from 5th drum) used so far (2/5/2009 12:30PM)
		35		
		36		
		37		
		38		
		39		
		40		
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	**Sampling Methods:**	**Notes:**
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	Page _1_ of ____.

APPENDIX G

STANDARD OPERATING PROCEDURES

110 South Downey Avenue, Indianapolis, Indiana 46219-6406
Telephone 317-630-9060, Facsimile 317-630-9065
www.MundellAssociates.com

MUNDELL & ASSOCIATES, INC.

STANDARD OPERATING PROCEDURE

Soil Sampling

1.0 Scope & Application

This sample collection procedure is to be used when collecting soil samples from explorative soil borings. This procedure is not suitable for collection of other media types, specifically surface water, groundwater, sediment, sludge, or air vapors. Soils are collected using a procedure that minimizes outside contamination, cross contamination, and dilution of the sample by contaminant volatilization.

2.0 Definitions

PID – Photo-Ionization Detector

PPE – Personal Protective Equipment

QA – Quality Assurance

QC – Quality Control

VOC – Volatile Organic Compounds

3.0 Health & Safety Warnings

3.1 Appropriate PPE will be chosen depending on the known site conditions. Latex or Nitrile protective gloves will be used when handling soil samples

3.2 A hard-hat, steel-toed boots, and reflective safety vest are required when working near any heavy equipment.

4.0 Cautions

Soil samples must be placed into a cooler chilled to 4 degrees Celsius (°C) or 39 degrees Fahrenheit (°F) immediately after collection in order to minimize volatilization of contaminants, particularly VOCs.

5.0 Personnel Qualifications

5.1 Personnel must be able to accurately describe soils based on USCS (Unified Soil Classification System) and Munsell Color System classification methods.

5.2 Personnel must be able to direct the operator of the sampling device (drilling rig) or be able to operate the sampling device themselves.

5.3 Personnel must be 40-hour OSHA certified and must have taken their annual 8-hour refresher training.

6.0 Apparatus & Materials

6.1 Laboratory-issued glass soil jars with Teflon-lined lids (4 ounces), VOA vials (40 mL) with appropriate preservative (distilled water, methanol, etc.), and Terra Core Samplers (one time use transfer tool) for collection of laboratory samples.

6.2 Sealable plastic bags for field screening for VOCs and a calibrated PID.

6.3 Cooler filled with ice to chill and store soil samples.

6.4 Latex or nitrile protective gloves and other appropriate PPE.

7.0 Instrument Calibration

7.1 The PID must be calibrated no more than 24 hours in advance of field screening soil samples.

7.2 This is a brief description of the standard two-point calibration procedure for the MiniRAE photoionization detector manufactured by RAE Systems, Inc. First, the zero point of the calibration curve is obtained by allowing thirty seconds of exposure to "fresh" ambient air free of impurities, without detectable contaminants (0.0 ppm), and an approximate oxygen value of 20.9%. After the zero calibration is complete, the second point of the calibration curve ("span" calibration) is obtained by connecting the PID to a cylinder of reference gas (default gas is 100.0 ppm of isobutylene) with the appropriate flow regulator (500 cc/min) or, alternatively, by filling a Tedlar bag with the reference gas and then connecting the PID to the bag. After thirty seconds, the instrument will have performed and completed the "span" calibration and will display a reading of 100.0 ppm or a reading within 2.0 ppm of 100.0 ppm. After the two-point calibration, the instrument will update its settings and be ready for screening soil samples.

8.0 Sample Collection

8.1 Rate of sampling is subject to change and should be referenced in the site-specific plan and will vary between state and federal programs. As a general guideline, however, soil samples will be collected at each 2 foot interval below ground surface. Samples to be submitted for analysis will be taken from the interval(s) exhibiting the highest field instrument response (PID reading for VOCs) or at any interval with odors or soil discoloration indicating contamination. Additionally, knowledge of depths with impacts related to the site history will be considered when deciding which soil interval(s) to submit for analysis. If all field instrument responses are generally low (less than 2.0 ppm), then a sample for submittal will be taken from the interval directly above the water table or the area that may include the “smear zone”. Samples for submittal may also be taken from the bottom of the boring for vertical delineation of impacts.

8.2 The soil type of each sample will be logged by the on-site geologist. Soil descriptions will be based on USCS (Unified Soil Classification System) and Munsell Color System classification methods. A general description of the soil appearance, moisture content, and firmness will also be noted. For exact measurements of soil composition, the soil samples may be submitted to a geotechnical laboratory for sieve analysis, hydrometer, Atterberg limits, moisture content, etc.

8.3 Each sample will be collected from the soil columns from the soil borings using latex or nitrile gloves, which will be discarded after each sample collection.

8.4 Glass jars should be filled with soil to minimize headspace in the jar. VOA vials should each receive approximately 5 grams of soil using a disposable Terra Core Sampler. Glass jars and VOA vials should be appropriately labeled (date/time of collection, sampler name, boring name, sample interval, etc.) and then immediately placed in the cooler.

8.5 The remaining portion of the soil sample should be placed in a sealable bag and staged in an area where the sample can volatilize (i.e., in sunlight or a heated location). After about 1-15 minutes, the soil sample should be field-screened with a calibrated PID. These PID readings may determine if the matching sample in the cooler should be sent to the laboratory. The field-screened portion of the sample should then be appropriately disposed of, typically as Non-Hazardous waste.

9.0 Handling & Preservation

9.1 All soil samples will be handled while wearing protective latex or nitrile gloves.

9.2 All soil samples will be immediately placed into and stored in a cooler chilled to 4 degrees Celsius (°C) or 39 degrees Fahrenheit (°F) until delivered to the laboratory.

9.3 All coolers will be packed with cushioning materials prior to shipment to the laboratory in order to prevent breakage of sample containers. Field personnel will insert proper chain-of-custody documentation (in a protective plastic bag) into each cooler of samples when shipping to the laboratory.

10.0 Data Management & Records Management

10.1 The on-site geologist will log soil descriptions and any other pertinent information.

10.2 Field personnel will follow proper chain-of-custody procedures (SOP for Chain of Custody)

10.3 All field paperwork will be delivered to the appropriate project manager upon completion of field sampling activities.

References

American Standard Testing Method D-2488: Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)

Indiana Department of Environmental Management (IDEM) Office of Land Quality. Supplemental Guidance for Sampling Soil and Waste Samples for Volatile Organic Compounds (VOCs) SW-846 Method 5035A. March 2008.

110 South Downey Avenue, Indianapolis, Indiana 46219-6406
Telephone 317-630-9060, Facsimile 317-630-9065
www.MundellAssociates.com

MUNDELL & ASSOCIATES, INC.

STANDARD OPERATING PROCEDURE

Groundwater Sampling

1.0 Scope & Application

The goal of ground-water sampling is to collect samples that are "representative" of in-situ groundwater conditions and to minimize changes in groundwater chemistry during sample collection and handling. This sample collection procedure is to be used when collecting groundwater samples from monitoring wells. This procedure is not suitable for collection of other media types, specifically surface water, soil, sediment, sludge, or air vapors. Groundwater should be collected using a procedure that minimizes outside contamination, cross contamination, and dilution of the sample by contaminant volatilization.

2.0 Definitions

Sampling device - refers to a sampling method, i.e., use of bailer, pumps, tubing, micro-purge, and other sampling techniques and devices.

PPE – Personal Protective Equipment

QA – Quality Assurance

QC – Quality Control

VOA- Volatile Organic Analysis

VOC – Volatile Organic Compounds

3.0 Health & Safety Warnings

3.1 Appropriate PPE will be chosen depending on the known site conditions. Latex or Nitrile protective gloves will be used when handling groundwater samples

3.2 A hard-hat, steel-toed boots, and reflective safety vest are required when working near any heavy equipment.

4.0 Cautions

4.1 Groundwater sample collection and handling procedures can be a source of variability in water-quality concentrations due to differences in sampling personnel, sampling procedures, and equipment.

4.2 The total depth of the well is required to calculate the volume of standing water in the well and to document the amount of siltation that may have occurred. Moreover, measuring the depth to the bottom of a well provides checks for casing integrity and for siltation of the well screen. Well redevelopment or replacement may be needed in the event of corrosion, silting, and biofouling, which can result in a sluggish response or no response to water-level changes, as well as changes in ground-water chemistry.

4.3 Groundwater samples must be placed into a cooler chilled to 4 degrees Celsius (°C) or 39 degrees Fahrenheit (°F) immediately after collection in order to minimize volatilization of contaminants, particularly VOCs.

4.4 Once removed from the well, non dedicated sampling equipment should be decontaminated to help ensure that there will be no cross contamination between wells. Disposable items should be properly disposed between wells.

5.0 Personnel Qualifications

5.1 Personnel must be trained in sampling procedures and use of sampling equipment.

5.2 Personnel must be able to direct the operator of the sampling device (sampling system) or be able to operate the sampling devices themselves.

5.3 Personnel must be 40-hour OSHA certified and must have taken their annual 8-hour refresher training.

6.0 Apparatus & Materials

6.1 Laboratory-issued glass VOA open top vials (40 mL) or IL amber glass bottles or 250 mL plastic bottles with appropriate preservative (distilled water, HCl, etc.) for collection of laboratory samples.

6.2 Water level Indicator, Oil/Water Interface Meter, disposable polyethylene bailers, nylon cord, Troll 9500 Low-Flow Sampling System, Double valve low flow pump, polyethylene tubing, 5-gallon buckets with lids, Decontamination equipment.

6.3 Cooler filled with ice to chill and store GW samples.

6.4 Latex or nitrile protective gloves, safety glasses, and other appropriate PPE.

6.5 Field book, Groundwater/Well sampling log, Chain of custody form, Labels, required forms, Pens, Markers, scissors, and paper towels.

7.0 Instrument Calibration

7.1 Calibrate all field portable meters and sampling probes according to manufacturer's specifications. Record calibration information in field book.

8.0 Water level gauging, Well volume measurements and Well purging

8.1 At each well, the well cap should be removed and groundwater levels must be allowed to equilibrate to atmospheric pressure for at least 30 minutes.

8.2 Depth to groundwater must be measured using an electronic water level indicator meter or oil /water interface probe capable of measuring water levels and liquid phase hydrocarbon (LPH) thickness to the nearest 0.01 feet. The interface probe must be washed with non-phosphate detergent and rinsed with distilled water prior to collecting water level measurements from each well.

8.3 If LPH is detected in any of the monitoring wells, the thickness of LPH must be measured/calculated and recorded.

8.4 Monitoring wells must be purged of three well volumes of water (or to dryness) prior to sampling using the appropriate sampling equipment such as a disposable polyethylene bailer or a low flow micro-purge sampler which is submerged in the middle of the screened interval of the well.

9.0 Sample Collection

The ground-water sampling methods to be employed should be dependent on site-specific conditions and requirements, such as data-quality objectives and well accessibility. Rate of sampling is subject to change and should be referenced in the site-specific plan and will vary between state and federal programs. The monitoring wells will be sampled using the following procedures:

9.1 At each well, the well cap will be removed and groundwater levels will be allowed to equilibrate to atmospheric pressure for at least 30 minutes. The depth-to-water measurement will be made in all wells to be sampled prior to sampling activities, which may change the water level, such as bailing, pumping, or hydraulic testing in any single well. All readings are to be recorded to the nearest one-hundredth of a foot.

9.2 Samples can only be collected after using a purging technique by removing three (3) times the volume of static water calculated for each well.

9.3 Sampling using bailers- Groundwater will be purged and collected using a 3.0 ft long, 1.6 in outer diameter, pre-cleaned, factory-sealed, disposable single-check valve polyethylene (poly) bailer. Groundwater will then be transferred from the bottom discharge end of the bailer into appropriate sample containers such as the 40 mL glass sample vials (VOA) containing appropriate preservative (hydrochloric acid (HCl), for chlorinated volatiles. A new, factory-sealed, disposable polyethylene bailer must be used at each well location.

9.4 Sampling using micro-purge low flow technique- A double-valve low-flow pump will be used for micro-purge sampling. The pump should be submerged to the approximate mid-point of the screen. Other intervals can be used to target specific zones. The pump however must be at least 2 feet from the bottom of well so excess turbidity is not created. A water level must be used while sampling. Drawdown must not be more than 0.3 feet during sampling process. The pump should be started at the lowest flow volume, and adjusted higher as long as maximum drawdown is not exceeded. Volumes could reach 1.0L/min, but should not exceed this. The parameters that will be measured for stability are as follows; pH, temperature, conductivity, oxygen-reduction potential(ORP), dissolved oxygen(DO), and turbidity. The parameters are stable when 3 consecutive readings do not vary more than 10% for turbidity and DO, 3% for conductivity and temperature, 20 millivolts for ORP, and 0.1 for pH. Groundwater parameters will be measured using a calibrated Troll 9500 Low–flow sampling system sampler with dedicated polyethylene tubing. Samples will be collected from the discharge end of the sampler into clean 40 ml Teflon lined VOA vials so as not to allow headspace. The double valve pump must be washed with non-phosphate detergent and rinsed with potable water prior to sampling each subsequent monitoring well, while the dedicated tubing must be replaced with new tubing between each monitoring well sampled. If the parameter stability requirements are not met or the drawdown exceeds 0.3 ft. the well will be purged of 3 well volumes prior to collecting samples using the low-flow pump or bailers.

9.5 Field Duplicate, Matrix Spike (MS) and Matrix Spike Duplicate (MSD) samples will be collected at a rate of one per 20 GW samples during each sampling event for quality control purposes. Trip blank samples will also be collected when sampling for VOCs at a rate of one per sampling event.

9.6 Excess purge water generated during groundwater sampling events will be placed in 55-gallon drums located on site for appropriate disposal off site.

9.7 All groundwater water samples will be uniquely labeled, placed on ice, and delivered to the laboratory, using the appropriate chain-of-custody protocol, to be analyzed for appropriate contaminants of concern via U.S. EPA approved methods of analysis (e.g., volatile organic compounds (VOCs) via U.S. EPA SW-846 Method 8260).

9.0 Handling & Preservation

9.1 All GW samples will be handled while wearing protective latex or nitrile gloves.

9.2 All GW samples will be collected in 40mL VOA vials or IL amber glass bottles containing the appropriate preservatives.

9.3 All GW samples will be immediately placed into and stored in a cooler chilled to 4 degrees Celsius (°C) or 39 degrees Fahrenheit (°F) until delivered to the laboratory.

9.4 All coolers will be packed with cushioning materials prior to shipment to the laboratory in order to prevent breakage of sample containers. Field personnel will insert proper chain-of-custody documentation (in a protective plastic bag) into each cooler of samples when shipping to the laboratory.

10.0 Data Management & Records Management

10.1 Field personnel will record anything unusual or any problems encountered while well gauging, purging, or groundwater sampling.

10.2 Field personnel will follow proper chain-of-custody procedures (SOP for Chain of Custody)

10.3 All field paperwork will be delivered to the appropriate project manager upon completion of field sampling activities.

11.0 Groundwater Well Sampling Data Collection

Items to be recorded either in the field notebook or on data sheets include:

11.1 Data to be recorded each field day

1. Project No.
2. Location
3. Field personnel names, titles, and duties
4. Date and time

5. Weather

11.2 Data to be recorded for each well

1. Well type (ex. pumping or recovery well, well nest, monitoring well, etc.)
2. Well head (reference point) elevation
3. Depth from top of casing (reference point) to 1st interface
4. Depth from top of casing (reference point) to 2nd interface
5. Depth from top of casing (reference point) to bottom of casing/sediment
6. Note any unusual observation (ex. silting-in, product color, product clarity, grout, HNu or monitoring readings, damaged wells, bacterial build up, equipment failure, etc.).
7. Method of collection and the time since pumping or bailing started
8. Volume purged or evacuated removed from the well prior to sampling
9. Disposition of purge water
10. Depth or interval from which samples were taken
11. Time of sample collection
12. Appearance, color or odor at time of collection (clear, milky, colorless, etc.) and
13. Field parameters (ex. pH, conductivity, temperature, dissolved oxygen, etc. if required).
14. Decontamination procedure used for equipment

References

Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers. GROUND WATER FORUM ISSUE PAPER Douglas Yeskis* and Bernard Zavala** Office of Solid Waste and Emergency Response. U.S.EPA. May 2002.

Indiana Department of Environmental Management (IDEM) Office of Land Quality Geological Services Technical Memorandum Micro-Purge Sampling for Monitoring Wells. January 2003.

Sampling and analysis of environmental chemical pollutants: a complete guide. Emma P. Popek. Academic Press. 2003

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110 South Downey Avenue, Indianapolis, Indiana 46219-6406
Telephone 317-630-9060, Facsimile 317-630-9065
www.MundellAssociates.com

MUNDELL & ASSOCIATES, INC.

STANDARD OPERATING PROCEDURE

Vapor Intrusion – Air Sampling

1.0. Scope & Application

This sample collection procedure is to be used when collecting indoor air, sub-slab soil vapor samples, and air samples from high-vacuum soil vapor extraction systems. This procedure is not suitable for collection of other media types, specifically surface water, groundwater, sediment, sludge, or soil.

2.0 Background

Vapor Intrusion is defined as vapor phase migration of volatile organic and/or inorganic compounds into occupied buildings from underlying contaminated ground water and/or soil. Contaminant exposure via this transport pathway could pose a significant risk to the public, specifically from halogenated organic compounds such as chlorinated solvents. EPA's Office of Solid Waste and Emergency Response (OSWER) recommends both indoor air and sub-slab vapor sampling in potentially affected buildings at sites containing elevated levels of soil and groundwater contamination. Sub-slab sampling is used to differentiate indoor and outdoor sources of volatile organic and/or inorganic compounds from the compounds emanating from the subsurface media.

3.0. Definitions

PPE – Personal Protective Equipment

QA – Quality Assurance

QC – Quality Control

VOC – Volatile Organic Compounds

4.0 Health & Safety Warnings

4.1 Appropriate PPE will be chosen depending on the known site conditions.

4.2 A hard-hat, steel-toed boots, and reflective safety vest are required if working near any heavy equipment.

5.0 Personnel Qualifications

Personnel must be 40-hour OSHA certified and must have taken their annual 8-hour refresher training.

6.0 Apparatus & Materials

7.1 Sub-slab construction and installation equipment should be stainless steel to ensure that the construction materials are not a source of VOCs. Teflon tubing should be used for sub-slab vapor sampling.

7.2 Laboratory-issued 6-liter, inert, stainless-steel summa canisters, flow control regulators, and manifold for sample duplicate.

7.3 SVE system sampling requires a 60mL latex free syringe with needle, one-way male-lock stopcock, and 22cc vapor vials with aluminum caps and Teflon septa.

7.0 Instrument Maintenance

Summa air canisters and flow control regulators will be cleaned and maintained by the analytical laboratory issuing the equipment.

8.0 Sub-Slab Probe Construction & Installation

8.1 Contact local utility companies to identify and mark utilities coming to the building from the outside.

8.2 Drill pilot hole to assess thickness of the slab. Use a rotary hammer drill to first create a shallow “outer” hole (7/8 in) that partially penetrates the slab (1 inch). Remove cuttings with a small vacuum cleaner. Use rotary hammer drill to create smaller “inner” hole (5/16 in) through the remainder of the slab and about 3 inches into the sub-slab material.

8.3 Using knowledge of the slab thickness, cut tubing to ensure that vapor probe will “float” in the slab. Construct probes with stainless steel tubing and compression or thread fittings. Set sub-slab vapor probes in drill holes with the top of the probes flush with the slab and use recessed stainless steel or brass plugs so as to not interfere with day-to-day use of the buildings.

8.4 Mix quick drying Portland cement (which expands upon drying ensuring a tight seal) with water to form slurry and injector push into the space between the probe and the "outer" hole. Allow cement to cure for at least 24 hours prior to sampling.

8.5 The number of sub-slab vapor probes installed in each building will be determined on a case-by-case basis, depending on known site conditions.

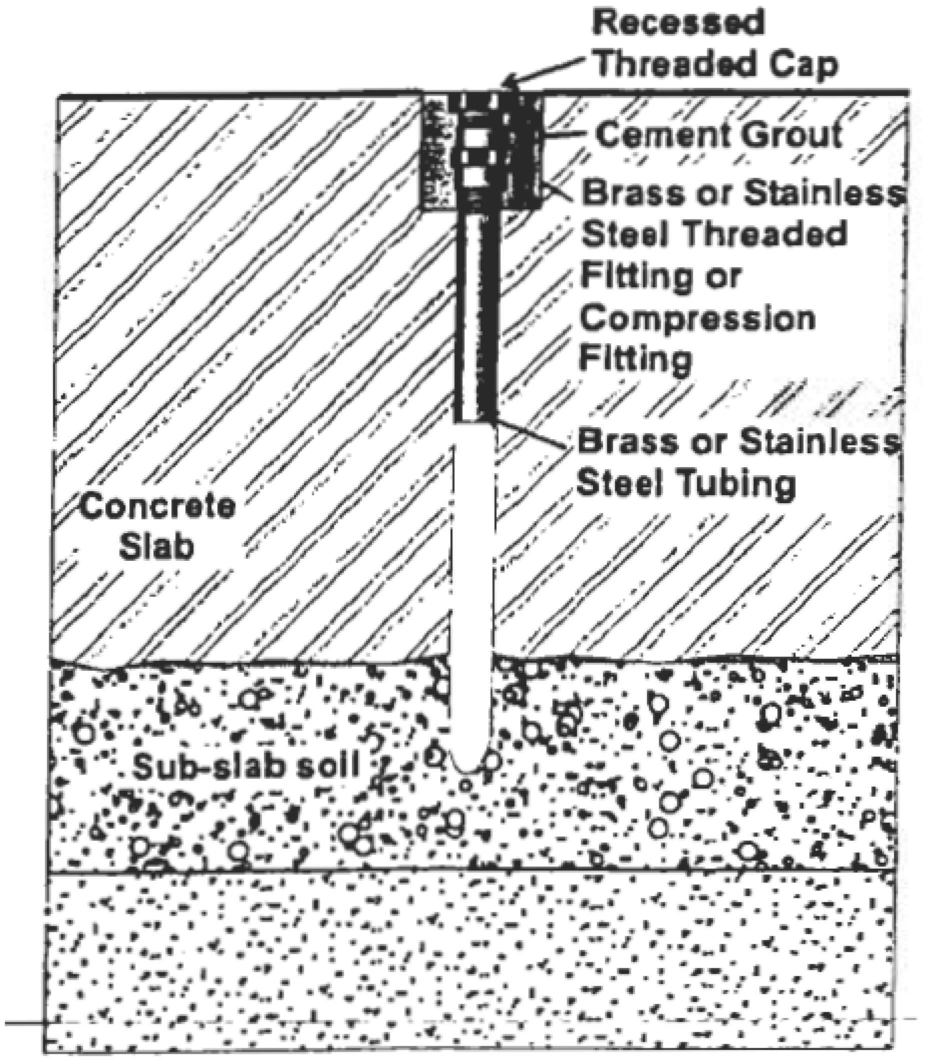


Figure from DiGiulio USEPA.

9.0 Sample Collection

9.1 Sampling collection requirements are subject to change and should be referenced in the site-specific plan and will vary between state and federal programs. As a general guideline, however, three air samples (sub-slab, basement/crawl-space air, and living room air) should be collected from each building along with an ambient outdoor air sample. It is advisable to conduct at least two sampling events at each building, preferably four consecutive quarterly sampling events to account for any seasonal variability that may exist. Indoor air and sub-slab samples should be collected 2 to 5 feet above the floor (in the normal breathing zone) and as close as possible to the center of the room or building footprint, respectively, while avoiding areas where sampling would interfere with daily building use. The ambient air sample should be placed outdoors, between 2 to 5 feet above the ground surface, and not downwind of any potential sources of contaminants.

9.2 It is recommended that the buildings be closed, with doors and windows shut, 12 to 24 hours before air sampling begins and that the use of appliances that induce large pressure differences (e.g. exhaust fans, clothes dryers, operating fireplaces) be avoided during this time. Additionally, it is recommended that locations adjacent to windows and air supplies be avoided when choosing a sampling location.

9.3 Weather conditions (from the 24 hour sampling period and 24 hours prior to the sampling period), wind direction (for outdoor ambient air sample), air temperature (indoor and outdoor temperatures), and any other pertinent site conditions should be recorded during the sampling event.

9.4 Prior to opening the air intake valve on each summa air canister, the summa canister ID number, the associated flow control regulator ID number, the starting pressure (in Hg), and a description of the sample location should be recorded. Upon retrieval of the summa canisters after approximately 24 hours, the end pressure should be recorded prior to closing the air intake valve. Each summa canister should have an approximate starting pressure between -25 and -30 in Hg and should draw in air for at least a 24 hour period, possibly longer if the constituents in question are at such low concentrations that a greater mass must be obtained for quantification. It is preferred that the summa canister not reach atmospheric pressure (zero (0) in Hg) at the end of the sampling period.

9.5 For sub-slab sampling, connect stainless steel fitting and Teflon tubing to sub-slab vapor probe. Connect other end of Teflon tubing to a peristaltic pump. Purge approximately three times the air volume of the vapor probe cavity using a hand pump or peristaltic pump. Disconnect Teflon tubing from pump and connect to the fitting on the flow control regulator connected to the summa canister.

9.6 For duplicate sample, attach laboratory-supplied manifold to two summa canisters. Attach a single flow control regulator to the manifold. If there is a difference in the starting pressures of the two summa canisters, allow a few seconds for pressure equilibration, then record a single starting pressure for the duplicate sample. Alternatively, duplicate sampling may be conducted by placing two canisters side-by-side and opening their respective intake valves at the same time. If using this approach, record the starting and end pressures of each summa canister.

9.7 Prior to sampling the SVE systems, an initial PID reading is collected from the air system. The flow rate reading is also collected from the manometer on each system.

9.8 When sampling the SVE system, 50cc of air is initially drawn into the syringe from the septum and the sample is then discarded. After this purge, the needle is inserted into the air stream and 40cc of sample is drawn into the syringe. The syringe is held in place for 30 seconds, the stopcock is closed, and the needle is withdrawn from the sample port. The needle is immediately inserted through the septum into the 22cc sample vial, keeping punctures to a minimum. The stopcock is opened and the plunder is completely compressed. The vial is quickly removed and the process is repeated until all samples have been collected.

10.0 Handling

All summa canisters will be packed with cushioning materials prior to shipment to the laboratory in order to prevent damage to canisters or flow controllers. Field personnel will insert proper chain-of-custody documentation into each box of air samples when shipping to the laboratory.

11.0 Data Management & Records Management

11.1 The on-site environmental scientist will record sampling equipment ID numbers, descriptions of the sample locations, and the start and end pressures of the summa canisters. They will also note weather, wind direction, air temperature, and any other pertinent information.

11.2 Field personnel will follow proper chain-of-custody procedures (SOP for Chain of Custody)

11.3 All field paperwork will be delivered to the appropriate project manager upon completion of field sampling activities.

References

DiGiulio, Dominic. USEPA. Standard Operating Procedure (SOP) for Installation of Sub-Slab Vapor Probes and Sampling Using EPA Method TO-15 to Support Vapor Intrusion Investigations, Draft.

USEPA. EPA530-D-02-004. OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance). November 2002.

110 South Downey Avenue, Indianapolis, Indiana 46219-6406
Telephone 317-630-9060, Facsimile 317-630-9065
www.MundellAssociates.com

Standard Operating Procedures – Geophysical Methods

Overview

This Standard Operating Procedures (SOP) includes technical guidance and methodologies for conducting surface and borehole geophysical surveys using the following techniques: electromagnetic (EM) induction for apparent electrical conductivity and metallic response mapping, time domain EM metal detection, two-dimensional electrical resistivity (2D-ERI) imaging, seismic refraction, and downhole/borehole logging. The following sections will discuss the various instruments used, in-field procedures (data acquisition), instrument calibration procedures, and data processing necessary to perform surface and downhole/borehole surveys.

Personnel Qualifications

Application of geophysical techniques require site specific decisions and several factors including project objectives, site limitations and instrument limitations should be accounted before one or more techniques are approved for a given survey. A senior level geophysicist with extensive knowledge and experience will approve and oversee/perform each geophysical survey.

Site Mapping and Documentation

All geophysical field personnel working on a given site will keep a detailed recording of all time spent, all events that take place, all site features, and all anomalies discovered either by visual inspection of geophysical imaging, within a field book. The locations of existing site features, as well as all geophysical anomalies will be recorded and later incorporated into a geo-referenced site map.

Geophysical Techniques

1. Electromagnetic Induction (EMI)

Over the past two decades, EMI sensors have been effective tools for non-invasively mapping variations in apparent electrical conductivity and metallic response over large areas. The sensor operates by passing an alternating current through the transmitter coil, which produces a magnetic field that in turn induces eddy currents in the subsurface. The net magnetic response sensed by the receiver coil is then dependent on the amount of current generated throughout the soil profile, and therefore represents an average conductivity over a particular measurement location. The secondary magnetic field is measured by the receiver coil in parts per million (ppm) of the primary field and has two components, in-phase and quadrature. If the instrument operates under low induction numbers, the in-phase component depends upon the magnetic susceptibility, i.e. the earth's ability to be magnetized (metallic response), and the quadrature component, depends directly on the apparent electrical conductivity.

Various types of EMI based equipment are commercially available and have different measurement depths, sensitivity, and resolution. The project goals and the site conditions will decide the need to utilize one or more specific instruments, sometimes in combination with other geophysical techniques.

1.1. Geonics EM31

1.1.1 *Instrument Specification*

This hand-held instrument provides measurements of apparent electrical conductivity in millisiemens per meter (mS/m), and works at an operating frequency of 9.8 kHz with an inter-coil spacing of 3.66 meters. The instrument is capable of operating in two modes – vertical dipole mode and horizontal dipole mode. The vertical dipole mode provides a depth of investigation of approximately 5 meters and horizontal dipole modes provides a depth of investigation of approximately 2 meters.

1.1.2 *Field Methods and Preparations*

Before commencing the data acquisition, the survey area needs to be visually inspected, and all potential sources of EM interferences should be identified. These potential sources may include (but are not limited to): underground or overhead utilities, manholes, known buried metallic objects, unknown buried metal objects, and surface metallic objects. The preliminary visual inspection should also include determining any variations in the surface topography within the survey area.

1.1.3 *Calibration*

The personnel performing the geophysical survey should remove all potential sources of interference from their body and pockets including keys, coins, metallic belt, or steel toe boots. Before a survey is conducted using the EM-31, five (5) instrument tests are to be performed. These tests should be conducted in an area free from metal objects and electromagnetic interference.

The first test, a battery check, is performed to ensure proper supply voltage over the duration of the survey. To check the battery, set MODE switch to OPER position and rotate the RANGE switch to BATT position. If meter reads above ±4.4 then batteries (C-size) are in good condition. If not, then replace them with fresh C-size batteries.

The second test is a DC null adjustment to verify the zero position of the receiver circuitry. To perform this check, first attach the transmitter coil tube. Set the RANGE switch to least sensitive position (1,000 mS/m), then Set the MODE switch OPER and check the zero reading. The tolerance for this test is ±1 mS/s. If the reading is not within ±1 mS/s of zero, adjust the reading use the DC ZERO CONTROL, located under front panel. Remove battery pack to gain access to the controls. Once this is done, turn the instrument off and attach the receiver coil tube.

The third test is to modify the zero component of the in-phase reading. To do this, set the RANGE switch to 100 mS/m. (if reading on the meter is off-scale, i.e. >100 mS/m, set the RANGE Switch to 1000 mS/m. Then, set the MODE switch to the OPER position and adjust the in-phase meter reading to zero using the COARSE and FINE COMPENSATION controls. The tolerance for this check is ±1 ppt.

The fourth test checks the phase of the instrument. To check the phase of the instrument, set the MODE switch to the PHASE position. Note the meter reading and rotate the COARSE control one step clockwise. If the conductivity meter reading remained the same (tolerance ±0.2), the phase is already correct. Return the COARSE control to its original position. If there is a difference in the readings, with the COARSE control in its original position, adjust the PHASE potentiometer about ¼ turn clockwise. Repeat the phase test. If the difference in readings has decreased, repeat procedure or if the difference has increased, the PHASE potentiometer should be rotated counter-clockwise. Always remember to set the COARSE control back to its original position. This can be confirmed by checking that the in-phase meter reads zero with the MODE switch set to OPER. If it does not read zero, use the coarse and fine compensation controls to obtain zero on the in-phase meter.

The fifth and final test is to check the sensitivity of the instrument. To do this, set the MODE switch to the COMP position and rotate the COARSE control clockwise one step. The conductivity reading should change between 22 to 26 mS/m. Return the coarse switch to its original setting and set the mode switch to OPER. The EM31 is now ready to make ground conductivity measurements.

1.1.4 *Data Collection*

For a gridded survey, an origin point (preferably one of the corners of the survey area) will be established. Using the Pythagorean theorem (3, 4, 5 triangle) to generate 90 degree angles, a baseline (X-direction) and a vertical line (Y-direction) will be created and these X and Y lines will be used to create a site grid. On the handheld computer, the data acquisition program EM31ALG will be used and a bi-directional grid (North-South or East-West) will be initiated. At this point, input the various survey parameters including line length, line spacing, width of survey area, and set the sample time (6-12 readings/sec, depending on necessary resolution). Data acquisition may begin at this point.

For a GPS based survey, a mapping (sub-meter) or survey grade (4-6 inches) GPS will be connected to the handheld computer, using COM2 and enabling the NMEA data string output. Using the NAV31 data acquisition program, make sure to set the baud rate to 9600, no parity, 8 data bits, and 1 stop bit. Verify that that the instrument outputs data to COM1 port. A data file can then be created and saved onto the computer's hard drive. Start data acquisition and begin walking in straight parallel lines spaced approximately 1 meter apart, using site features or cones to control position.

1.1.5 *Data Processing and Interpretations*

Upon the completion of data acquisition, the field data will be downloaded from the data logger or handheld computer to a field laptop computer for processing. For gridded surveys, ensure the uniformity and lengths of data transverses and make any adjustments as necessary. The data will then be exported to a .XYZ file or a .DAT file. For GPS controlled surveys, the GPS data quality and positional accuracy will be verified, and all points of insufficient accuracy (greater than 1 meter) will be discarded. At this point, the field data will then be gridded, contoured, and plotted in *Golden Software Surfer v11.0* on top of a geo-referenced site map to ensure the quality and coverage of the data acquired.

1.2. Geonics EM38

1.2.1. *Instrument Specification*

This hand-held instrument provides measurements of apparent electrical conductivity in millisiemens per meter (mS/m) and works at an operating frequency of 14.6 kHz, with an inter-coil spacing of 1 meter. The instrument is capable of operating in two modes – vertical dipole mode and horizontal dipole mode. The vertical dipole mode provides a depth of investigation of about 1.5 meters and horizontal dipole modes provides a depth of investigation of about 0.75 meters.

1.2.2. *Field Methods and Preparations*

Before commencing the data acquisition, the survey area needs to be visually inspected, and all potential sources of EM interferences should be identified. These potential sources may include (but are not limited to): underground or overhead utilities, manholes, known buried metallic objects, unknown buried metal objects, and surface metallic objects. The preliminary visual inspection should also include determining any variations in the surface topography within the survey area.

1.2.3. *Calibration*

The personnel performing the geophysical survey should remove all potential sources of interference from their body and pockets including keys, coins, metallic belt, or steel toe boots. Before a survey is conducted using the EM-38, five (5) instrument tests are performed. These tests should be performed in an area free from metal objects and electromagnetic interference.

The first test, a battery check, is performed to ensure proper supply voltage over the duration of the survey. To check the battery, set the MODE switch to BAT. If the meter reads above 720 units, then the batteries (9V-alkaline) are in good condition. If not, then replace them with fresh 9V alkaline batteries.

The second test is called initial in-phase nulling and should be carried out at the beginning of day at the first survey station (as recommended by operating manual). To null the instrument, lift the instrument to a height of about 1.5 meter and place it in horizontal operating mode. Set the Mode switch to I/P meter position and null the I/P meter to indicate zero by 1m control. The I/P meter readings should be approximate zero (+/-10 mS/m) at 1.5 meter height.

The third test is called instrument zero and should be carried on in the beginning of each day and should be checked at least twice a day (depending on the length of the survey). This adjustment will set the instrument response such that at a great height above the surface, it would read zero. To zero the instrument, lift the instrument to 1.5 meters and set it in horizontal dipole mode and adjust Q/P meter reading to approximately 50mS/m. Now, rotate the instrument to vertical dipole mode and note Q/P reading again. If the vertical dipole mode reading is twice the horizontal dipole mode the instrument is zero is correctly set.

The fourth test is called final in-phase nulling. It requires repeating the same process as initial in-phase nulling except that the instrument is on the ground.

The fifth and final test is to check the sensitivity of the instrument. To do this, with instrument at 1.5 meters in horizontal dipole position, set the MODE switch to 1m position and rotate the Q/P zero control clockwise one turn. The meter should change between 20 to 28 mS/m for 1m coil separation and 28 and 30 mS/m for 0.5 m coil separation. Return the zero control to its original position.

1.2.4. *Data Collection*

For a gridded survey, an origin point (preferably one of the corners of the survey area) will be established. Using the Pythagorean theorem (3, 4, 5 triangle) to generate 90 degree angles, a baseline (X-direction) and a vertical line (Y-direction) will be created and these X and Y lines will be used to create a site grid. On the handheld computer, the data acquisition program EM38ALG will be used and a bi-directional grid (North-South or East-West) will be initiated. At this point, input the various survey parameters including line length, line spacing, width of survey area, and set the sample time (6-12 readings/sec, depending on necessary resolution). Data acquisition may begin at this point.

For a GPS based survey, a mapping (sub-meter) or survey grade (4-6 inches) GPS will be connected to the handheld computer, using COM2 and enabling the NMEA data string output. Using the NAV38 data acquisition program, make sure to set the baud rate to 9600, no parity, 8 data bits, and 1 stop bit. Verify that that the instrument outputs data to COM1 port. A data file can then be created and saved onto the computer’s hard drive. Start data acquisition and begin walking in straight parallel lines spaced approximately 1 meter apart, using site features or cones to control position.

1.2.5. *Data Processing and Interpretations*

logger or handheld computer to a field laptop computer for processing. For gridded surveys, ensure the uniformity and lengths of data transverses and make any adjustments as necessary. The data will then be exported to a .XYZ file or a .DAT file. For GPS controlled surveys, the GPS data quality and positional accuracy will be verified, and all points of insufficient accuracy (greater than 1 meter) will be discarded. At this point, the field data will then be gridded, contoured, and plotted in *Golden Software Surfer v11.0* on top of a geo-referenced site map to ensure the quality and coverage of the data acquired.

1.3 Geonics EM61

1.3.1 *Instrument Specification*

This is a time-domain based EM instrument which provides measurements of secondary electrical response (metallic response) in millivolts at multiple time gates. These time-gates allow a more complete measurement of the instrument response decay rate, and can thus detected buried metal with sharp resolution.

1.3.2 *Field Methods and Preparations*

Before commencing the data acquisition, the survey area needs to be visually inspected, and all potential sources of EM interferences should be identified. These potential sources may include (but are not limited to): underground or overhead utilities, manholes, known buried metallic objects, unknown buried metal objects, and surface metallic objects. The preliminary visual inspection should also include determining any variations in the surface topography within the survey area.

1.3.3 *Calibration*

The first test is the equipment test. This test is performed once a day, at the start of the day. First, inventory and inspect all components. Verify that each item is present and inspect the cables, connectors, harnesses, etc. for signs of wear or damage. Spare cables are essential as the cables are often the most vulnerable part of a system.

Once the equipment has been inspected, the cable test may be performed. This test also only need be performed once a day. To do this, assemble the instrument, power it up, and allow it to run for five (5) minutes to warm up. Then, with the instrument held in a static position, collect data, and move cables to test for shorts and broken wires or pins. Shake cable starting on one end and proceeding to the other. An assistant is helpful to observe any changes in instrument response. If shorts are found, mark cable, set aside and replace.

If the equipment appears to be working correctly, the static background test and static instrument response tests may then be performed. Unlike the equipment test and cable tests, which are only performed at the start of the day, these test should be performed twice a day, once prior to data collection, and ones at the end of data collection. These tests are important because they are used to determine whether the instrument is collecting stable readings. Improper instrument function, the presence of local sources of ambient noise (such as EM transmissions from high-voltage electric lines), and instability in the earth's magnetic field (as during a magnetic storm) are all potential causes of inconsistent, non-repeatable readings. The operator must review the readings to confirm their stability prior to beginning the geophysical survey. To perform the background test, first establish an area for the test that offers convenient access, is free of metal (surface and sub-surface), and is sufficiently far from roads and power lines, transmitters, etc. to avoid these sources of noise. Once the test location has been selected, place the instrument at its normal operating height and orientation so that it will remain stationary and begin data collection. Collect readings for a minimum of three minutes. Data collected during static tests should be retained for documentation purposes. It should be noted that the effects of ambient noise may vary across a project site. Therefore, it may be necessary to perform several static tests across the survey area.

Following the static background test, a static instrument test should be performed. The static instrument test quantifies the response of the instrument to a standard test item. A standard 2'' diameter trailer ball steel trailer ball is a preferred test item, because it is easily acquired and transported. To perform the test, leaving the instrument in the same position as used in the static background test, place the test item below the sensor, and then collect data for a minimum three minute period. The test will document the amplitude of response to the test item and instrument drift.

Once the static tests have been completed, the six-line test may be performed. While the other tests should be performed at least once per day, the six-line test need only be performed on the first day of data collection for a given site. This test can be used for all geophysical instruments, and the process is illustrated **in Figure 1.** First, select an area that has little background noise and no sources of anomalous responses. Mark six lines of the same length, over which to collect data. First, the background response over the test area is established in Lines 1 and 2. Next, a standard test item, such as the steel trailer hitch ball used in the static response test will be used for Lines 3 through 6. On Line 3 and 4, walk at a normal pace. On Line 5, walk at a fast pace, and on Line 6, walk at a slow pace. Heading effects, repeatability of response amplitude, positional accuracy, and latency are evaluated in these lines.

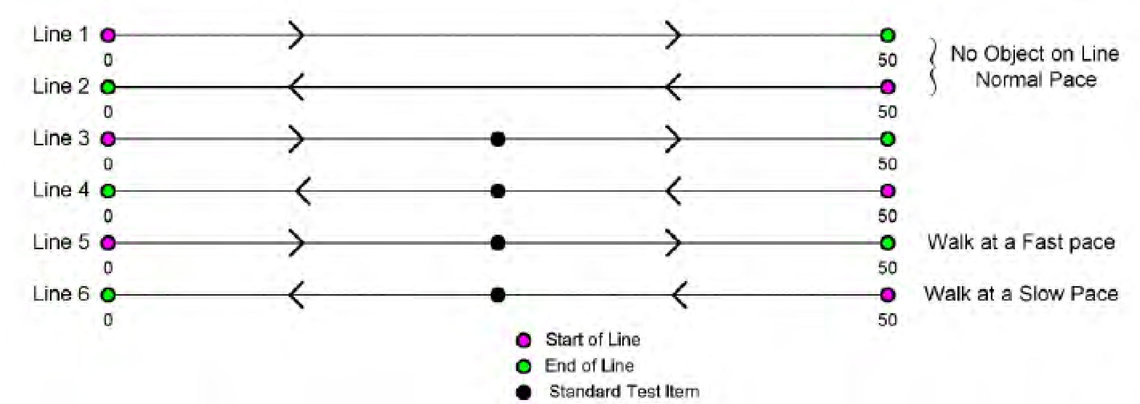


Figure 1. Example Six Line Test Site

A summary of the various tests performed on the EM-61, and the frequency at which they should be performed can be seen in the following table:

Test	Frequency of Testing		
	Beginning of Day	Beginning and End of Day	First Day of Project Only
Personnel Test	X		
Cable Shake	X		
Static (Background)		X	
Static (Response)		X	
6 Line Test			X

Once these tests have been performed, the EM-61 is ready to collect data.

1.3.4 *Data Collection*

For a gridded survey, an origin point (preferably one of the corners of the survey area) will be established. Using the Pythagorean theorem (3, 4, 5 triangle) to generate 90 degree angles, a baseline (X-direction) and a vertical line (Y-direction) will be created and these X and Y lines will be used to create a site grid. On the handheld computer, the data acquisition program EM61MK2 will be used and a bi-directional grid (North-South or East-West) will be initiated. At this point, input the various survey parameters including line length, line spacing, width of survey area, and set the sample time (6-12 readings/sec, depending on necessary resolution). Data acquisition may begin at this point.

For a GPS based survey, a mapping (sub-meter) or survey grade (4-6 inches) GPS will be connected to the handheld computer, using COM2 and enabling the NMEA data string output. Using the NAV61MK2 data acquisition program, make sure to set the baud rate to 9600, no parity, 8 data bits, and 1 stop bit. Verify that that the instrument outputs data to COM1 port. A data file can then be created and saved onto the computer's hard drive. Start data acquisition and begin walking in straight parallel lines spaced approximately 1 meter apart, using site features or cones to control position.

1.3.5 *Data Processing and Interpretations*:

Upon the completion of data acquisition, the field data will be downloaded from the data logger or handheld computer to a field laptop computer for processing. For gridded surveys, ensure the uniformity and lengths of data transverses and make any adjustments as necessary. The data will then be exported to a .XYZ file or a .DAT file. For GPS controlled surveys, the GPS data quality and positional accuracy will be verified, and all points of insufficient accuracy (greater than 1 meter) will be discarded. At this point, the field data will then be gridded, contoured, and plotted in *Golden Software Surfer v11.0* on top of a geo-referenced site map to ensure the quality and coverage of the data acquired.

2. Two-dimensional Electrical Resistivity Imaging (2D-ERI)

In the electrical resistivity method, artificially-generated electric current (I, amps) is introduced into the subsurface and potential difference (V, volts) is measured along the surface in the area undergoing current flow (**Figure 2**). Electrical resistivity is calculated using volumetric geometrical factors related to electrode arrangements known as arrays.
Traditionally, electrical resistivity data were collected in differing electrode array configurations and modes of data collection depending upon the project objectives. **Figure 3** illustrates some of the more common electrode array configurations. Each array type has specific application depending upon the resistivity structure of the subsurface. For example, the Wenner and Schlumberger array types are primarily used in situations where the subsurface is largely horizontally stratified, whereas the dipole-dipole array is

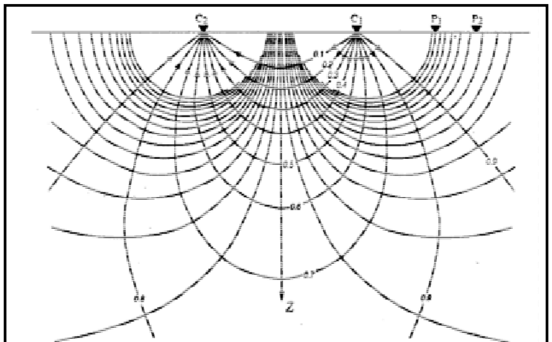


Figure 2. Distribution of current and potential lines for two current electrodes at the surface of a homogeneous half space.

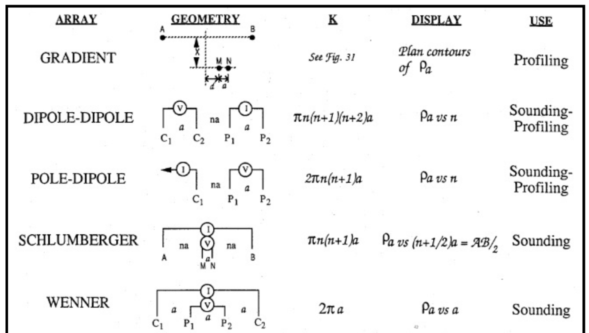


Figure 3. The common arrays used in resistivity**.**

more applicable in those situations where lateral variations in electrical resistivity are sought. Choice of array type has also traditionally depended upon whether the data were being collected in a profiling mode, sounding mode, or a combination of both known as a pseudosection. Practical and economic considerations have often been as large a factor as technical considerations because of the amount of effort required to collect electrical resistivity data. With rapid advances in computer and electronics technologies, acquisition and processing of large amounts of high quality resistivity data have become practical. Whereas in the past data collection was segregated in to horizontal profiling and 1-dimensional vertical soundings, it has now become possible to collected data in sufficiently high volume to model 2-di mensional or 3-dimensional apparent resistivity data resulting in a “true” resistivity cross-section or volume.

2.1 Advanced Geosciences (AGI) SuperstingR8:

2.1.1 Instrument Specification

The SuperSting R8 electrical resistivity system consists of three parts: the StingR8 control box, the 84-channel switch box, and up to 84 passive electrodes. Using a preset command file for a given array type, the Sting R8 sends a series of commands to the switch box, which in turn send current to the correct electrodes to take a given measurement.

2.1.2 Field Methods and Preparation

Before commencing the data acquisition, the survey area needs to be visually inspected, and all potential sources of EM interferences should be identified. These potential sources may include (but are not limited to): underground or overhead utilities, manholes, known buried metallic objects, unknown buried metal objects, and surface metallic objects. The preliminary visual inspection should also include determining any variations in the surface topography within the survey area along the resistivity profile location. Once the resistivity profile location is marked and cleared, the stainless steel stakes are pounded into the ground and electrode cables are laid out. The electrodes are then connected with the stakes using copper connectors. The cables are then connected to switch box, which is in turn connected to the SuperStingR8 control box.

2.1.3 Calibration

One of the traditional practical shortcomings of electrical resistivity, aside from its labor-intensive nature, is the difficulty in establishing consistent, high quality ground contact. As a result, resistivity data have often been plagued with high levels of spurious noise introduced by poor electrical contact, high contact resistance, and other undesirable effects caused by stray electrical currents and spontaneous potentials. The SuperSting R8 has been programmed to optimize accuracy and reduce data noise. This has been accomplished in several ways. First, prior to data collection, the SuperSting R8 has the ability to conduct electrode resistance testing to ensure that consistent, high quality contact is made with the ground at each electrode. Second, an automated electrode contact resistance test is run. This test consists of passing electrical current between adjacent electrodes while simultaneously measuring voltage (V) and current (I). From these measurements the contact resistance is calculated (i.e., resistance, $R = V/I$). This testing serves several quality assurance needs. First, if the electrode is not properly connected to the grounded stake or if there are problems with the internal switching electronics of the electrode, an error will be indicated by the SuperSting R8. Thus, the operator can verify that all electrodes are properly connected and that all internal circuitry is operating properly. Second, the SuperSting R8 units display the resistance value of the individual electrode pairs. The goal of the contact resistance testing is to establish relatively consistent electrode resistance values, all within an acceptable range. Typically, electrode resistance values of greater than approximately 1,000 ohms justify additional efforts to improve contact. Improved electrode contact can be achieved by driving the stake deeper or at a new location and/or by pouring salt water on the ground at the electrode location to decrease the contact resistance. Finally, during data acquisition, the SuperSting R8 conducts repeat readings and carries out running statistical analysis for each configuration until the desired level of accuracy is realized.

2.1.4 Data Collection

The equipment operator programs the SuperSting R8 to collect data in any manner the operator wishes. Typically, a standard array is selected and specifications regarding the number of electrodes and the data collection scheme are programmed directly into the SuperSting R8. Once this is completed, the SuperStingR8 executes the selected command file, ordering the system to switch on four active electrodes at a given time (i.e., two current and two potential electrodes). The electrodes are typically laid out in a straight line, evenly spaced. The final resistivity data from each four-electrode combination along with the electrode positions are stored in internal memory for later downloading and processing. After performing the contact resistance test, a data file is setup up and the desired array type is selected. Finally, all the survey parameters such as electrode spacing, data acquisition constraints, line geometry, and measurement statistics are entered in. At this point, the data collection is initiated by selecting the MEA button.

2.1.5 Data Processing and Interpretations

Two-dimensional electrical imaging surveys are widely used to map areas of moderately complex geology where conventional resistivity sounding and profiling techniques are inadequate. The results from such surveys are plotted in the form of a pseudosection that gives an approximate but distorted picture of the subsurface. This is why inversion modeling is performed on resistivity data. After the field data has been collected, it is downloaded to a laptop or personal computer for subsequent processing and inversion modeling using the both the AGI software *EarthImager v. 2.4 and* the *RES2DINV v3.5* program, written by Dr. Meng Heng Loke, to obtain a cross-section of the “actual” resistivities of subsurface materials. This is accomplished through the process of generating a model resistivity cross-section, calculating the theoretical apparent resistivity pseudo-section that would result from such a model, and comparing the theoretical pseudo-section to the one collected in the field. The model is then altered through a number of iterations until the theoretical and field-collected pseudo-sections closely match each other. At this point the model is considered to be a reasonable estimation of the “actual” resistivities of the actual subsurface materials. It should be noted that while both inversion modeling programs will automatically choose the optimum inversion parameters for a particular data set, the parameters that affect the inversion process can be modified by the user. Three different variations of the least-squares method are provided: a very fast quasi-Newton method, a slower but more accurate Gauss-Newton method, and a moderately fast hybrid technique that incorporates the advantages of the quasi-Newton and Gauss-Newton methods. The smoothing filter can be adjusted to emphasize resistivity variations in the vertical or horizontal directions. Two different variations of the smoothness constrained least-squares method are provided; one optimized to reduce the difference between the calculated and measured apparent resistivity values, the other which guaranties models with smooth resistivity variations even with noisy data sets. Resistivity information from borehole and other sources can also be included to constrain the inversion process.

After the inversion process, the data is exported out the modeling programs in the form of a .DAT file, which is then gridded, contoured, and plotted using *Golden Software Surfer v11.0*.

3. Seismic Refraction

The seismic refraction technique utilizes seismic shockwaves that travel downward from the ground surface where they are generated, refract along the boundaries between geologic layers, and return to the surface where they are measured and recorded. Minimally, this type of survey requires three pieces of field equipment: a seismic source (*e.g.*, typically a sledgehammer), a seismic receiver (*i.e.*, a geophone), and a timer (*e.g.*, a seismograph).

3.1 Geometrix Strataview R24

3.1.1 Instrumentation Specifications

This unit is a digital recording seismograph designed for refraction and shallow reflection surveys. Up to 24 geophone inputs are stored in digital memory, allowing the seismic wave traces to be inspected and modified before they are printed on the built-in plotter or alternatively, recorded to an internal hard drive for subsequent processing with the on-board computer or an external workstation. The receivers used in this survey are 4.5-hertz (Hz) vertical geophones, connected to the seismograph by two separate, 12-takeout geophone cables.

3.1.2 Field Methods and Preparations

Before commencing the survey, the site area needs to be to surveyed visually and any potential sources of vibrations should be identified. These potential sources include pedestrians, vehicles, machinery, aircraft, and heavy wind, and all effort should be made to minimize the number of interference sources present during the data acquisition. Additionally, any changes in topography along the seismic profile location should be noted for processing purposes later. Once the profile location is marked and cleared, the geophones are inserted into the ground such that they are firmly placed. The geophones are then attached to the geophone cables, which are subsequently attached to the seismograph.

3.1.3 Calibration

There is no particular calibration required before the data collection. However, to ensure the quality of data, an introductory shot is collected prior to actual data acquisition to verify that all the geophones are working properly, that the ambient noise filter is set appropriately (given the level of ambient noise), that t the offset between the shot and the geophones is appropriate. The noise display setting can be selected to check if any particular geophones are extra noisy. These extra noisy geophones are then checked to ensure they are firmly placed into the ground and properly connected to the cables.

3.1.4 Data Collection

A typical seismic refraction survey consists of firmly planting the geophones in the ground at an even spacing along a straight line. A seismic impulse (called a “shot,” since explosives have generally been used for larger seismic surveys used in oil and gas exploration) is generated at time, t = zero, then the seismograph records the geophones’ response over time as the seismic wave travels through the subsurface and back up to the geophones. Five shots are typically recorded for each seismic setup, or spread: one short offset at each end, one long offset at each end, and one in the center of the spread. As each shot was collected, the operator monitored the geophone responses to ensure the quality of the data being recorded exceeded the noise induced by the local automobile, pedestrian traffic and background noise, and that the direct and refracted arrivals are clearly visible in the record.

3.1.5 Data Processing and Interpretations

Once the data acquisition is complete, the data is downloaded to a personal computer for processing using the software *IXRefrax v1.14* manufactured by Interpex. Using *IXRefrax*, each shot is imported, the profile geometry is verified and corrected for topography, and the first arrivals are picked. Next, the number of geologic layers seen in the refraction data (shown as an increase in seismic velocity) are specified and the layer velocities are calculated. Then, using the number of geologic layers and starting velocities, a GRM inversion model is run. This inversion estimates the best possible fit from the actual geologic model to the input starting values for the geologic layer velocities. After the inversion process is complete, ensure that the best fit model will actually make sense in the geologic settings predicted. Once the mode has been finalized, it is then exported to a .DAT file and is gridded, contoured, and plotted using *Golden Software Surfer v11.0.*

4 Downhole/Borehole Logging

Downhole/borehole logging consists of techniques that can monitor specific physical parameters of geologic layers by sending a probe down an existing well or an open borehole. The logging system consists of two primary components. The first is the integrated logging control unit, which remains at the surface with the equipment operator, and the second component is the downhole-logging probe.

4.1 Mount Sopris MGX-II

4.1.1 Instrument Specification

The MGX-II is portable downhole/borehole system manufactured by the Mount Sopris Instrument Company in Golden, Colorado. This system is a digital, single-channel system designed primarily for shallow environmental and engineering studies. The MGX-II (or the control unit) is joined physically and electronically to the chosen downhole probe with a steel cable, approximately 600 feet in length, containing a single insulated signal wire. The steel cable is spooled on an integrated electric winch mechanism that measures position of the probe to a precision of 0.01 feet with a digital odometer. The electrical signals transmitted by the downhole probe are passed from the winch to a signal processor within the logging unit. The processed digital data collected thus includes the probe depth, speed, and the probe-specific measurements of the borehole. Data from these probes are collected in a near-continuous manner as the probe is either lowered or raised in the borehole at a near-constant speed of 5 to 15 feet per minute, depending on the probe. The data are recorded in a portable laptop computer for real-time viewing, and storage for later analysis. The geophysical probes used on this project include the following:

a) EM39 Electromagnetic (EM) Resistivity Probe
The operating principal for the EM39 probe is that the intensity of an induced secondary electromagnetic field is directly proportional to the electrical resistivity/conductivity of materials such as rocks, soils, and fresh water. In fresh water environments, clay-rich sediments/rocks generally have lower electrical resistivity than do sands because there are layers of unbound cations and anions adsorbed to the outer surfaces of the clay minerals. In the presence of electrical current, these cations and anions are free to move and carry the electrical current. Similarly, fractured/weathered bedrock is much less resistive than competent bedrock.

The EM39 transmits a high frequency electromagnetic wave from a coil located at one end of the probe. At the other end of the probe is a receiver coil that detects the primary and secondary electromagnetic fields. The transmitted wave passes outside the well and into the formation to a distance of about three feet from the center of the hole. In the presence of a completely non-conductive medium, the receiver will only receive the primary transmitted wave. As the resistivity of the medium decreases (the conductivity increases), the primary wave induces alternating electrical current flow in the formation that is of the same frequency as the transmitted wave. This induced current in turn creates a secondary magnetic field that the receiver also picks up. As the resistivity of the material decreases, the strength of the secondary field also increases in a linear manner. This linear relationship breaks down in the presence of highly conductive materials such as steel casing (note that metal objects will register as negative or out-of-scale values). This probe outputs electrical resistivity in Ohm-meters (Ohm-m).

b) HLP 2375/S Natural Gamma probe;
The HLP 2375/S probe is a high sensitivity scintillometer that measures the gross natural gamma ray count. It has a relatively large sodium iodide crystal that optimizes the instrument sensitivity to the types of gamma rays generally encountered in clay minerals. The data are presented in units of gamma ray counts per second (cps). Most natural gamma ray emissions are caused by minerals containing potassium, uranium, and/or thorium. Clay minerals (which contain the radioactive isotope potassium-40) are generally the most commonly observed natural gamma emitters. In contrast, geologic layers that contain little to no clay minerals, emit very little gamma rays.

4.1.2 Field Methods and Preparation

Before beginning the borehole logging, the site area needs to be to surveyed visually and should be ensured that enough space is available along the borehole to perform the logging. The zero point (ground surface or top of the casing) should be recorded into the field book and it is preferable to have an estimate of the bottom of the boring. At this point the probe may be attached to the winch.

4.1.3 Calibration

The first calibration required is the assigning the zero point from where the depth will be measured (usually the ground surface or the top of the casing). This is done by lowering the probe until the top of the probe is even with the reference point, then assigning zero to that depth position within the log. Another quality assurance test is to record a background measurement from a borehole with known conditions and geology. While not always possible, this background measurement will provide more accurate correlation between the geophysical logs and the geologic interpretation.

4.1.4 Data Collection

The probe is lowered into the borehole using the MGX-II, using the MSLog software in the field PC to control the data acquisition. The name of the data file and the probe which is being used are assigned. The probe is then lowered at a rate of 5 to 15 feet per minute (depending on the probe) and any anomalies are noted in the operator's field book.

4.1.5 Data Processing and Interpretation

After the data collection, the data files are imported into *WellCAD v3.2* for processing and plotting. The data files are verified against extremely high or low values and any possible erroneous readings are removed for quality assurance. Next, a five point running average is used to further smooth random noise in the data. Once the data has been smoothed, it is plotted and interpreted for the presence of geologic strata.

5 Ground penetrating radar (GPR):

GPR involves a system that transmits electromagnetic pulses into the ground from an antenna near the surface. GPR works on a principle similar to the reflection seismic method widely used in the oil and gas industry. A narrow band radar wave pulse of short duration is emitted downward into the ground by a transmitting antenna. Nearby, a receiving antenna is used to record radar waves that are moving upward after being reflected from the boundaries between materials that have contrasting electrical conductivities and dielectric constants. The reflected signals are plotted by the computer as a "wiggle trace" directly below the position of the center of the antenna pair. The deeper an object is, the later in time the reflection will appear. However, using knowledge of the velocity of radar waves in a given media, the GPR profile can be presented in terms of depth.

The reflection of the waves is caused due to the change in dielectric constant of various interfaces. In general, most common GPR units used in utility locating/boring clearance provide a depth of investigation of anywhere from 3 to 8 feet bgs. However, actual depth penetration is highly site-specific and depends on the antenna frequency and the electrical properties of the media being scanned: lower frequencies equate to deeper penetration, but decreased resolution, whereas higher frequencies yield decreased penetration but higher resolution. Additionally, conductive soils such as silt and clay yield shallower penetration (compared to coarser grained sediments) for a given frequency of antenna, as they attenuate the radar signal.

During data acquisition, as the antenna is towed along a survey line, the GPR signals are processed and displayed on a graphic recorder called a digital video logger (DVL). Data are displayed as two-dimensional continuous profiles along the surveyed line, depicting distance versus time (or depth). In general, GPR can achieve superior resolution of subsurface features compared to other geophysical imaging methods, but only when favorable conditions exist.

5.1 Sensors and Software Noggin Plus GPR

5.1.1 Instrument Specification

The *Noggin Plus* (equipped with a *Smart Cart* and shielded 250 MHz and 1,000 MHz antennae) is a rapid, state-of-the-art data acquisition system that collects high resolution data continuously as it is operated. GPR is used to provide focused, detailed characterization of study areas. GPR data are collected along lines of profile providing cross-sectional output. Ideally, GPR can yield information about horizontal layering, limits of former excavations and fill areas, and the approximate depth and position of discrete objects, such as *utilities, utility trenches, former excavations, USTs, former concrete slabs and foundations, and voids.*

It should be noted that graphical outputs depicting GPR data illustrate the composite effect of how the environment, both above and below ground, react to the radar pulses radiated by the GPR system. Radar waves recorded by the receiver include those radiated directly from the transmitter, refracted along horizontal boundaries, reflected from objects both below and above ground, or reflected from naturally occurring features in addition to extraneous radar waves from other sources. Subsurface reflections are often associated with changes in soil and rock conditions, such as bedding, cementation, moisture and clay content, voids, fractures, and intrusions, as well as man-made objects such as utilities, waste, fill material, and reinforced concrete. An interface between two soil or rock layers having sufficiently different electrical properties will be evident in the radar profile. Buried metal and other discrete objects will also be detected for similar reasons.

5.1.2 Field Methods and Preparation

Before commencing the boring clearance, the vicinity of the proposed boring needs to be visually inspected and all potential obstructions or sources of EM interferences should be identified, noted, and removed if possible. The preliminary visual inspection should also include searching for surface evidence of utilities within the area such as: manholes, outlets, transformers, meters, light poles, water spigots, data boxes, and paint from previous utility locates. Finally, consideration should be taken to verify that the boring location has not been placed underneath an overhead obstruction such as a tree limb or a low hanging telephone or electric line.

5.1.3 Calibration

Prior to beginning the scan, verify that the battery voltage is above 11 volts in the main DVL menu. Next, collect a preliminary line of data to verify the depth of penetration being achieved, and make a note of it in the field book. In the depth settings menu, set the maximum depth to 1 to 2 feet below the limit of penetration. Finally, lay out a page and calibrate the GPR odometer, in order to verify that the unit is measuring accurate distance.

5.1.4 Data Collection

For each boring location, create a 12ft by 12ft grid with the proposed boring in the center, marking every 2 feet. If possible, orient the grid with the Y-axis facing north-south, and the X-axis facing west-east. Next, scan the grid in both the X and Y directions using the GPR. Any strong reflections detected during the process are marked on the ground and labeled with the depth it was imaged at. Utilities will be noted by a series of linear reflections, located at a similar depth, whereas random reflections are likely related either natural variations within the soil (a rock), or man-made debris. Regardless, if a proposed boring location is too close to any of the anomalies detected, it should be shifted accordingly to a clear location. If the boring location is located outside, the 250 MHz antenna should be used in order to achieve maximum penetration. However, if the boring location is located inside of a building, the 1,000 MHz antenna should be used to minimize air-wave reflections from walls, ceilings, racks, machinery, and equipment.

5.1.5 Data Processing

For this particular application (i.e. boring clearance), most data analysis is performed on the field. However, the GPR profiles can also be saved on the system and subsequently downloaded onto a PC to be processed in the office as well, using *Sensors and Software's EkkoMapper v4.0* software for further analysis and confirmation of anomalies.

APPENDIX H

TOXICOLOGICAL DATA

TETRACHLOROETHYLENE
CAS # 127-18-4

Agency for Toxic Substances and Disease Registry ToxFAQs September 1997

This fact sheet answers the most frequently asked health questions (FAQs) about tetrachloroethylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Tetrachloroethylene is a manufactured chemical used for dry cleaning and metal degreasing. Exposure to very high concentrations of tetrachloroethylene can cause dizziness, headaches, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death. Tetrachloroethylene has been found in at least 771 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is tetrachloroethylene?
(Pronounced tĕt′rə-klôr′ ō-ĕth′ə-lēn′)

Tetrachloroethylene is a manufactured chemical that is widely used for dry cleaning of fabrics and for metal-degreasing. It is also used to make other chemicals and is used in some consumer products.

Other names for tetrachloroethylene include perchloroethylene, PCE, and tetrachloroethene. It is a nonflammable liquid at room temperature. It evaporates easily into the air and has a sharp, sweet odor. Most people can smell tetrachloroethylene when it is present in the air at a level of 1 part tetrachloroethylene per million parts of air (1 ppm) or more, although some can smell it at even lower levels.

What happens to tetrachloroethylene when it enters the environment?

- Much of the tetrachloroethylene that gets into water or soil evaporates into the air.
- Microorganisms can break down some of the tetrachloroethylene in soil or underground water.
- In the air, it is broken down by sunlight into other chemicals or brought back to the soil and water by rain.
- It does not appear to collect in fish or other animals that live in water.

How might I be exposed to tetrachloroethylene?

- When you bring clothes from the dry cleaners, they will release small amounts of tetrachloroethylene into the air.
- When you drink water containing tetrachloroethylene, you are exposed to it.

How can tetrachloroethylene affect my health?

High concentrations of tetrachloroethylene (particularly in closed, poorly ventilated areas) can cause dizziness, headache, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death.

Irritation may result from repeated or extended skin contact with it. These symptoms occur almost entirely in work (or hobby) environments when people have been accidentally exposed to high concentrations or have intentionally used tetrachloroethylene to get a "high."

In industry, most workers are exposed to levels lower than those causing obvious nervous system effects. The health effects of breathing in air or drinking water with low levels of tetrachloroethylene are not known.

Results from some studies suggest that women who work in dry cleaning industries where exposures to tetrachloroethylene can be quite high may have more menstrual problems and spontaneous abortions than women who are not exposed. However, it is not known if tetrachloroethylene was responsible for these problems because other possible causes were not considered.

Results of animal studies, conducted with amounts much higher than those that most people are exposed to, show that tetrachloroethylene can cause liver and kidney damage. Exposure to very high levels of tetrachloroethylene can be toxic to the unborn pups of pregnant rats and mice. Changes in behavior were observed in the offspring of rats that breathed high levels of the chemical while they were pregnant.

How likely is tetrachloroethylene to cause cancer?

The Department of Health and Human Services (DHHS) has determined that tetrachloroethylene may reasonably be anticipated to be a carcinogen. Tetrachloroethylene has been shown to cause liver tumors in mice and kidney tumors in male rats.

Is there a medical test to show whether I've been exposed to tetrachloroethylene?

One way of testing for tetrachloroethylene exposure is to measure the amount of the chemical in the breath, much the same way breath-alcohol measurements are used to determine the amount of alcohol in the blood.

Because it is stored in the body's fat and slowly released into the bloodstream, tetrachloroethylene can be detected in the breath for weeks following a heavy exposure.

Tetrachloroethylene and trichloroacetic acid (TCA), a breakdown product of tetrachloroethylene, can be detected in the blood. These tests are relatively simple to perform. These tests aren't available at most doctors' offices, but can be performed at special laboratories that have the right equipment.

Because exposure to other chemicals can produce the same breakdown products in the urine and blood, the tests for breakdown products cannot determine if you have been exposed to tetrachloroethylene or the other chemicals.

Has the federal government made recommendations to protect human health?

The EPA maximum contaminant level for the amount of tetrachloroethylene that can be in drinking water is 0.005 milligrams tetrachloroethylene per liter of water (0.005 mg/L).

The Occupational Safety and Health Administration (OSHA) has set a limit of 100 ppm for an 8-hour workday over a 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) recommends that tetrachloroethylene be handled as a potential carcinogen and recommends that levels in workplace air should be as low as possible.

Glossary

Carcinogen: A substance with the ability to cause cancer.

CAS: Chemical Abstracts Service.

Milligram (mg): One thousandth of a gram.

Nonflammable: Will not burn.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Tetrachloroethylene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone:1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR

AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

TRICHLOROETHYLENE

CAS # 79-01-6

Division of Toxicology ToxFAQs™ **July 2003**

This fact sheet answers the most frequently asked health questions (FAQs) about trichloroethylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Trichloroethylene is a colorless liquid which is used as a solvent for cleaning metal parts. Drinking or breathing high levels of trichloroethylene may cause nervous system effects, liver and lung damage, abnormal heartbeat, coma, and possibly death. Trichloroethylene has been found in at least 852 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is trichloroethylene?

Trichloroethylene (TCE) is a nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste. It is used mainly as a solvent to remove grease from metal parts, but it is also an ingredient in adhesives, paint removers, typewriter correction fluids, and spot removers.

Trichloroethylene is not thought to occur naturally in the environment. However, it has been found in underground water sources and many surface waters as a result of the manufacture, use, and disposal of the chemical.

What happens to trichloroethylene when it enters the environment?

- Trichloroethylene dissolves a little in water, but it can remain in ground water for a long time.
- Trichloroethylene quickly evaporates from surface water, so it is commonly found as a vapor in the air.
- Trichloroethylene evaporates less easily from the soil than from surface water. It may stick to particles and remain for a long time.
- Trichloroethylene may stick to particles in water, which will cause it to eventually settle to the bottom sediment.
- Trichloroethylene does not build up significantly in plants and animals.

How might I be exposed to trichloroethylene?

- Breathing air in and around the home which has been contaminated with trichloroethylene vapors from shower water or household products such as spot removers and typewriter correction fluid.
- Drinking, swimming, or showering in water that has been contaminated with trichloroethylene.
- Contact with soil contaminated with trichloroethylene, such as near a hazardous waste site.
- Contact with the skin or breathing contaminated air while manufacturing trichloroethylene or using it at work to wash paint or grease from skin or equipment.

How can trichloroethylene affect my health?

Breathing small amounts may cause headaches, lung irritation, dizziness, poor coordination, and difficulty concentrating.

Breathing large amounts of trichloroethylene may cause impaired heart function, unconsciousness, and death. Breathing it for long periods may cause nerve, kidney, and liver damage.

Drinking large amounts of trichloroethylene may cause nausea, liver damage, unconsciousness, impaired heart function, or death.

Drinking small amounts of trichloroethylene for long periods may cause liver and kidney damage, impaired immune system function, and impaired fetal development in pregnant women, although the extent of some of these effects is not yet clear.

Skin contact with trichloroethylene for short periods may cause skin rashes.

How likely is trichloroethylene to cause cancer?

Some studies with mice and rats have suggested that high levels of trichloroethylene may cause liver, kidney, or lung cancer. Some studies of people exposed over long periods to high levels of trichloroethylene in drinking water or in workplace air have found evidence of increased cancer. Although, there are some concerns about the studies of people who were exposed to trichloroethylene, some of the effects found in people were similar to effects in animals.

In its 9th Report on Carcinogens, the National Toxicology Program (NTP) determined that trichloroethylene is "reasonably anticipated to be a human carcinogen." The International Agency for Research on Cancer (IARC) has determined that trichloroethylene is "probably carcinogenic to humans."

Is there a medical test to show whether I've been exposed to trichloroethylene?

If you have recently been exposed to trichloroethylene, it can be detected in your breath, blood, or urine. The breath test, if it is performed soon after exposure, can tell if you have been exposed to even a small amount of trichloroethylene.

Exposure to larger amounts is assessed by blood and urine tests, which can detect trichloroethylene and many of its breakdown products for up to a week after exposure. However, exposure to other similar chemicals can produce the same breakdown products, so their detection is not absolute proof of exposure to trichloroethylene. This test isn't available at most doctors' offices, but can be done at special laboratories that have the right equipment.

Has the federal government made recommendations to protect human health?

The EPA has set a maximum contaminant level for trichloroethylene in drinking water at 0.005 milligrams per liter (0.005 mg/L) or 5 parts of TCE per billion parts water.

The EPA has also developed regulations for the handling and disposal of trichloroethylene.

The Occupational Safety and Health Administration (OSHA) has set an exposure limit of 100 parts of trichloroethylene per million parts of air (100 ppm) for an 8-hour workday, 40-hour workweek.

Glossary

Carcinogenicity: The ability of a substance to cause cancer.
CAS: Chemical Abstracts Service.
Evaporate: To change into a vapor or gas.
Milligram (mg): One thousandth of a gram.
Nonflammable: Will not burn.
ppm: Parts per million.
Sediment: Mud and debris that have settled to the bottom of a body of water.
Solvent: A chemical that dissolves other substances.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Trichloroethylene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs™ Internet address is http://www.atsdr.cdc.gov/toxfaq.html . ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

1,2-DICHLOROETHENE
CAS # 540-59-0, 156-59-2, and 156-60-5

Agency for Toxic Substances and Disease Registry ToxFAQs **September 1997**

This fact sheet answers the most frequently asked health questions (FAQs) about 1,2-dichloroethene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to 1,2-dichloroethene occurs mainly in workplaces where it is made or used. Breathing high levels of 1,2-dichloroethene can make you feel nauseous, drowsy, and tired. *cis*-1,2-Dichloroethene has been found in at least 146 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA). *trans*-1,2-Dichloroethene was found in at least 563 NPL sites. 1,2-Dichloroethene was found at 336 sites, but the isomer (*cis*- or *tran*s-) was not specified.

What is 1,2-dichloroethene?
(Pronounced 1,2-dī-klôr′ ō-ĕth′ēn)

1,2-Dichloroethene, also called 1,2-dichloroethylene, is a highly flammable, colorless liquid with a sharp, harsh odor. It is used to produce solvents and in chemical mixtures. You can smell very small amounts of 1,2-dichloroethene in air (about 17 parts of 1,2-dichloroethene per million parts of air [17 ppm]).

There are two forms of 1,2-dichloroethene; one is called *cis*-1,2-dichloroethene and the other is called *trans*-1,2-dichloroethene. Sometimes both forms are present as a mixture.

What happens to 1,2-dichloroethene when it enters the environment?

- 1,2-Dichloroethene evaporates rapidly into air.
- In the air, it takes about 5-12 days for half of it to break down.
- Most 1,2-dichloroethene in the soil surface or bodies of water will evaporate into air.
- 1,2-Dichloroethene can travel through soil or dissolve in water in the soil. It is possible that it can contaminate groundwater.
- In groundwater, it takes about 13-48 weeks to break down.
- There is a slight chance that 1,2-dichloroethene will break down into vinyl chloride, a different chemical which is believed to be more toxic than 1,2-dichloroethene.

How might I be exposed to 1,2-dichloroethene?

- Breathing 1,2-dichloroethene that has leaked from hazardous waste sites and landfills.
- Drinking contaminated tap water or breathing vapors from contaminated water while cooking, bathing, or washing dishes.
- Breathing 1,2-dichloroethene, touching it, or touching contaminated materials in the workplace.

How can 1,2-dichloroethene affect my health?

Breathing high levels of 1,2-dichloroethene can make you feel nauseous, drowsy, and tired; breathing very high levels can kill you.

When animals breathed high levels of *trans*-1,2-dichloroethene for short or longer periods of time, their livers and lungs were damaged and the effects were more severe with longer exposure times. Animals that breathed very high levels of *trans*-1,2-dichloroethene had damaged hearts.

Animals that ingested extremely high doses of *cis*- or *trans*-1,2-dichloroethene died.

Lower doses of *cis*-1,2-dichloroethene caused effects on the blood, such as decreased numbers of red blood cells, and also effects on the liver.

The long-term (365 days or longer) human health effects after exposure to low concentrations of 1,2-dichloroethene aren't known. One animal study suggested that an exposed fetus may not grow as quickly as one that hasn't been exposed.

Exposure to 1,2-dichloroethene hasn't been shown to affect fertility in people or animals.

How likely is 1,2-dichloroethene to cause cancer?

The EPA has determined that *cis*-1,2-dichloroethene is not classifiable as to its human carcinogenicity.

No EPA cancer classification is available for *trans*-1,2-dichloroethene.

Is there a medical test to show whether I've been exposed to 1,2-dichloroethene?

Tests are available to measure concentrations of the breakdown products of 1,2-dichloroethene in blood, urine, and tissues. However, these tests aren't used routinely to determine whether a person has been exposed to this compound. This is because after you are exposed to 1,2-dichloroethene, the breakdown products in your body that are detected with these tests may be the same as those that come from exposure to other chemicals. These tests aren't available in most doctors' offices, but can be done at special laboratories that have the right equipment.

Has the federal government made recommendations to protect human health?

The EPA has set the maximum allowable level of *cis*-1,2-dichloroethene in drinking water at 0.07 milligrams per liter of water (0.07 mg/L) and *trans*-1,2-dichloroethene at 0.1 mg/L.

The EPA requires that any spills or accidental release of 1,000 pounds or more of 1,2-dichloroethene must be reported to the EPA.

The Occupational Health Safety and Health Administration (OSHA) has set the maximum allowable amount of 1,2-dichloroethene in workroom air during an 8-hour workday in a 40-hour workweek at 200 parts of 1,2-dichloroethene per million parts of air (200 ppm).

Glossary

Carcinogenicity: Ability of a substance to cause cancer.

CAS: Chemical Abstracts Service.

Fertility: Ability to reproduce.

Ingest: To eat or drink something.

Milligram (mg): One thousandth of a gram.

ppm: Parts per million.

Solvent: A chemical that can dissolve other substances.

References

This ToxFAQs information is taken from the 1996 Toxicological Profile for 1,2-Dichloroethene produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

VINYL CHLORIDE

CAS # 75-01-4

Division of Toxicology and Environmental Medicine ToxFAQs™ **July 2006**

This fact sheet answers the most frequently asked health questions (FAQs) about vinyl chloride. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to vinyl chloride occurs mainly in the workplace. Breathing high levels of vinyl chloride for short periods of time can cause dizziness, sleepiness, unconsciousness, and at extremely high levels can cause death. Breathing vinyl chloride for long periods of time can result in permanent liver damage, immune reactions, nerve damage, and liver cancer. This substance has been found in at least 616 of the 1,662 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is vinyl chloride?

Vinyl chloride is a colorless gas. It burns easily and it is not stable at high temperatures. It has a mild, sweet odor. It is a manufactured substance that does not occur naturally. It can be formed when other substances such as trichloroethane, trichloroethylene, and tetrachloroethylene are broken down. Vinyl chloride is used to make polyvinyl chloride (PVC). PVC is used to make a variety of plastic products, including pipes, wire and cable coatings, and packaging materials.

Vinyl chloride is also known as chloroethene, chloroethylene, and ethylene monochloride.

What happens to vinyl chloride when it enters the environment?

❏ Liquid vinyl chloride evaporates easily. Vinyl chloride in water or soil evaporates rapidly if it is near the surface.
❏ Vinyl chloride in the air breaks down in a few days to other substances, some of which can be harmful.
❏ Small amounts of vinyl chloride can dissolve in water.
❏ Vinyl chloride is unlikely to build up in plants or animals that you might eat.

How might I be exposed to vinyl chloride?

❏ Breathing vinyl chloride that has been released from plastics industries, hazardous waste sites, and landfills.
❏ Breathing vinyl chloride in air or during contact with your skin or eyes in the workplace.
❏ Drinking water from contaminated wells.

How can vinyl chloride affect my health?

Breathing high levels of vinyl chloride can cause you to feel dizzy or sleepy. Breathing very high levels can cause you to pass out, and breathing extremely high levels can cause death.

Some people who have breathed vinyl chloride for several years have changes in the structure of their livers. People are more likely to develop these changes if they breathe high levels of vinyl chloride. Some people who work with vinyl chloride have nerve damage and develop immune reactions. The lowest levels that produce liver changes, nerve damage, and immune reaction in people are not known. Some workers exposed to very high levels of vinyl chloride have problems with the blood flow in their hands. Their fingers turn white and hurt when they go into the cold.

The effects of drinking high levels of vinyl chloride are unknown. If you spill vinyl chloride on your skin, it will cause numbness, redness, and blisters.

Animal studies have shown that long-term exposure to vinyl chloride can damage the sperm and testes.

How likely is vinyl chloride to cause cancer?

The U.S. Department of Health and Human Services has determined that vinyl chloride is a known carcinogen. Studies in workers who have breathed vinyl chloride over many years showed an increased risk of liver, brain, lung cancer, and some cancers of the blood have also been observed in workers.

How can vinyl chloride affect children?

It has not been proven that vinyl chloride causes birth defects in humans, but studies in animals suggest that vinyl chloride might affect growth and development. Animal studies also suggest that infants and young children might be more susceptible than adults to vinyl chloride-induced cancer.

How can families reduce the risk of exposure to vinyl chloride?

Tobacco smoke contains low levels of vinyl chloride, so limiting your family's exposure to cigarette or cigar smoke may help reduce their exposure to vinyl chloride.

Is there a medical test to show whether I've been exposed to vinyl chloride?

The results of several tests can sometimes show if you have been exposed to vinyl chloride. Vinyl chloride can be measured in your breath, but the test must be done shortly after exposure. This is not helpful for measuring very low levels of vinyl chloride.

The amount of the major breakdown product of vinyl chloride, thiodiglycolic acid, in the urine may give some information about exposure. However, this test must be done shortly after exposure and does not reliably indicate the level of exposure.

Has the federal government made recommendations to protect human health?

Vinyl chloride is regulated in drinking water, food, and air. The EPA requires that the amount of vinyl chloride in drinking water not exceed 0.002 milligrams per liter (mg/L) of water.

The Occupational Safety and Health Administration (OSHA) has set a limit of 1 part vinyl chloride per 1 million parts of air (1 ppm) in the workplace.

The Food and Drug Administration (FDA) regulates the vinyl chloride content of various plastics. These include plastics that carry liquids and plastics that contact food. The limits for vinyl chloride content vary depending on the nature of the plastic and its use.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2006. Toxicological Profile for Vinyl Chloride (Update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

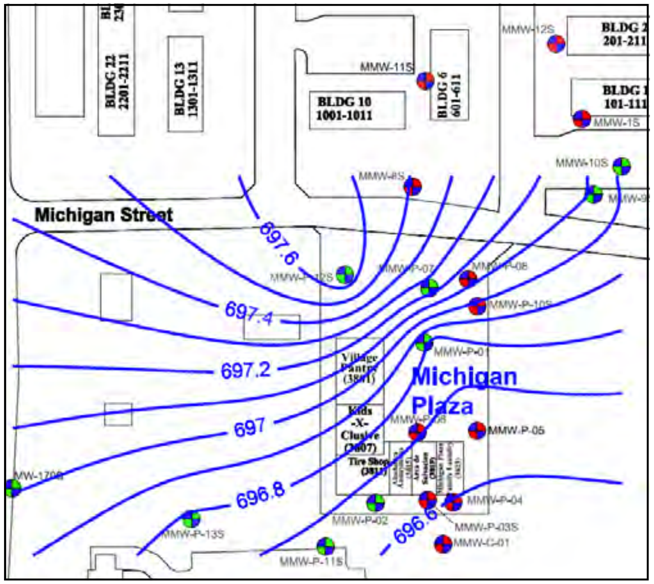
Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Environmental Medicine, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

Federal Recycling Program Printed on Recycled Paper

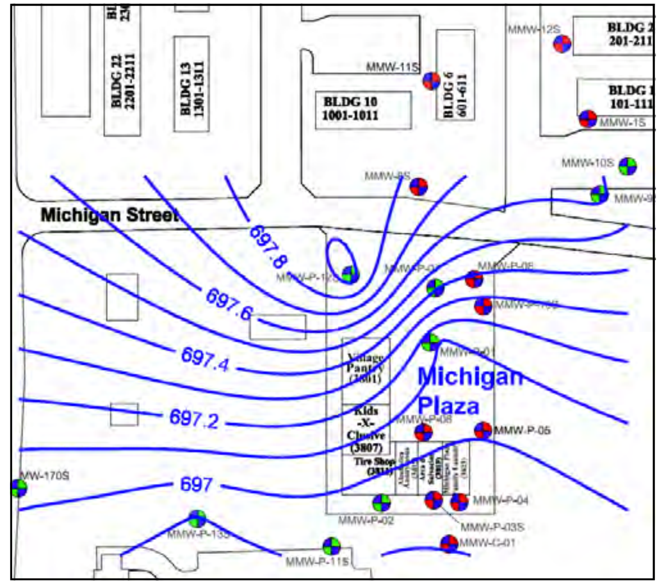
APPENDIX I

INJECTION GROUNDWATER GAUGING DATA

Figure I-1: Daily Potentiometric Maps From July 2013 Injection Event (7/2—7/5)



7/2/2013



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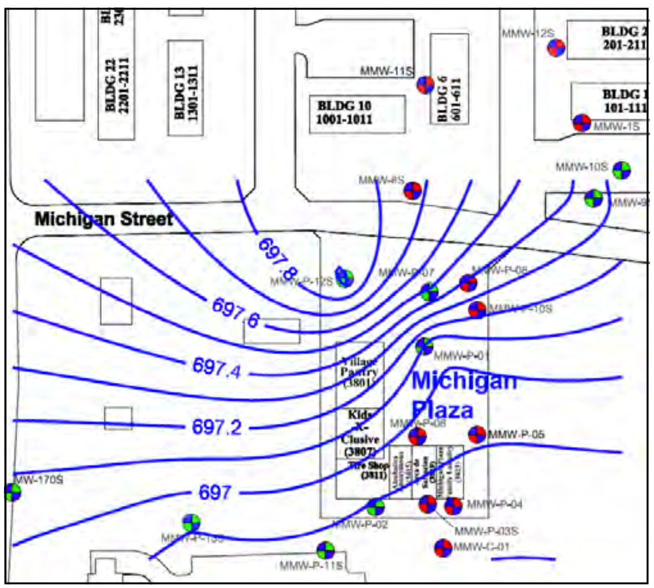
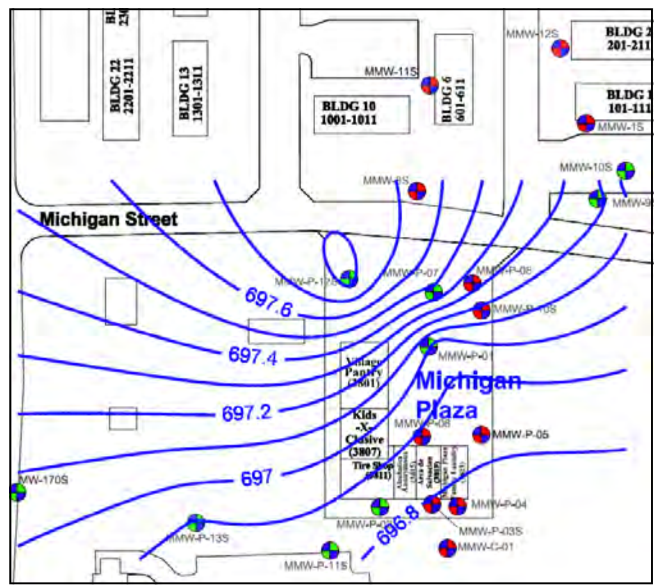


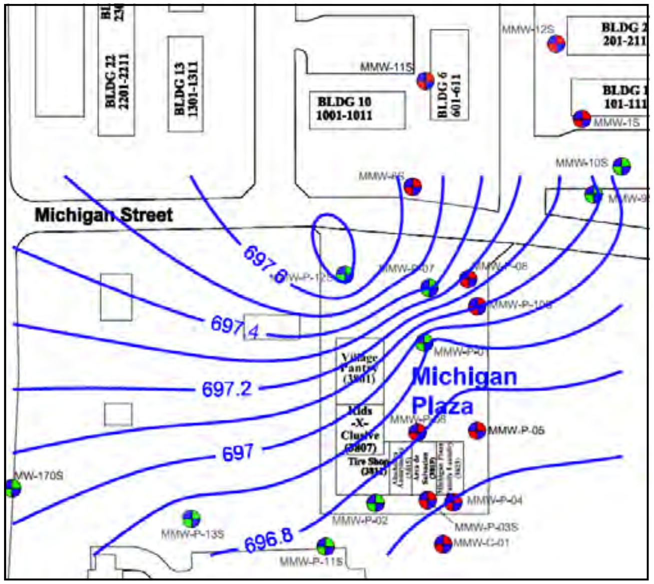
7/4/2013



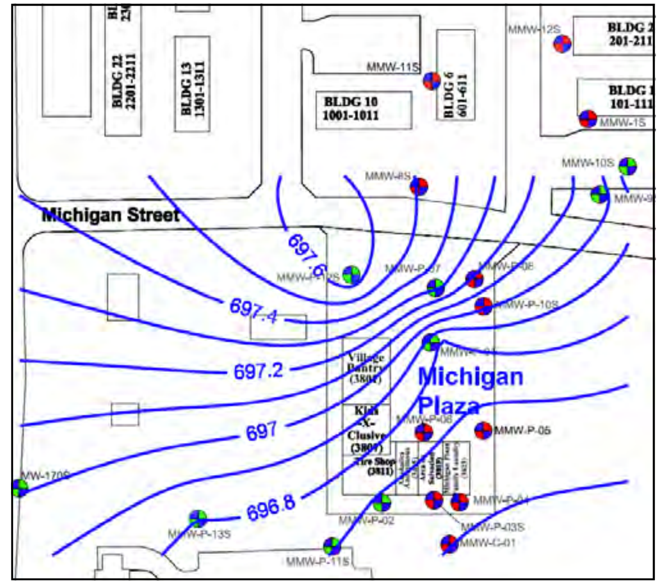
7/5/2013

Gauged with Transducer Hand Gauged Not Gauged

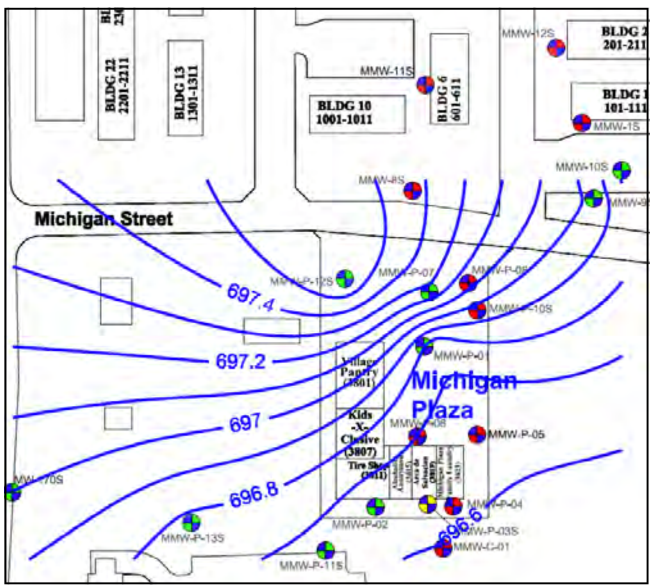
Figure I-2: Daily Potentiometric Maps From July 2013 Injection Event (7/6—7/9)



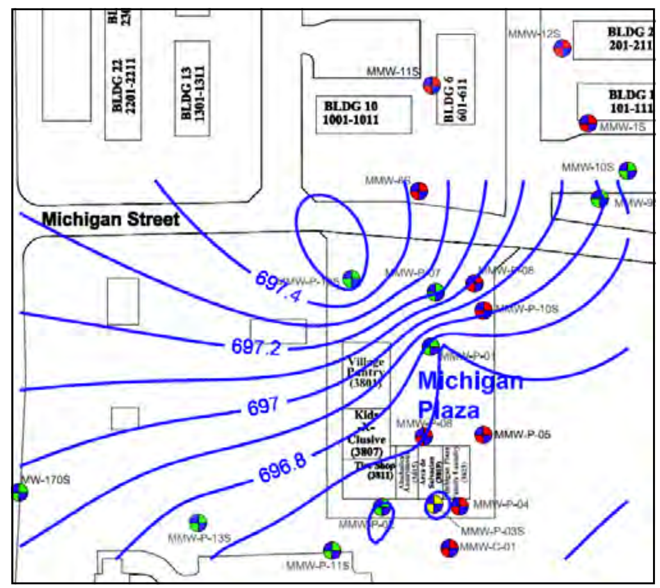
7/6/2013



7/7/2013



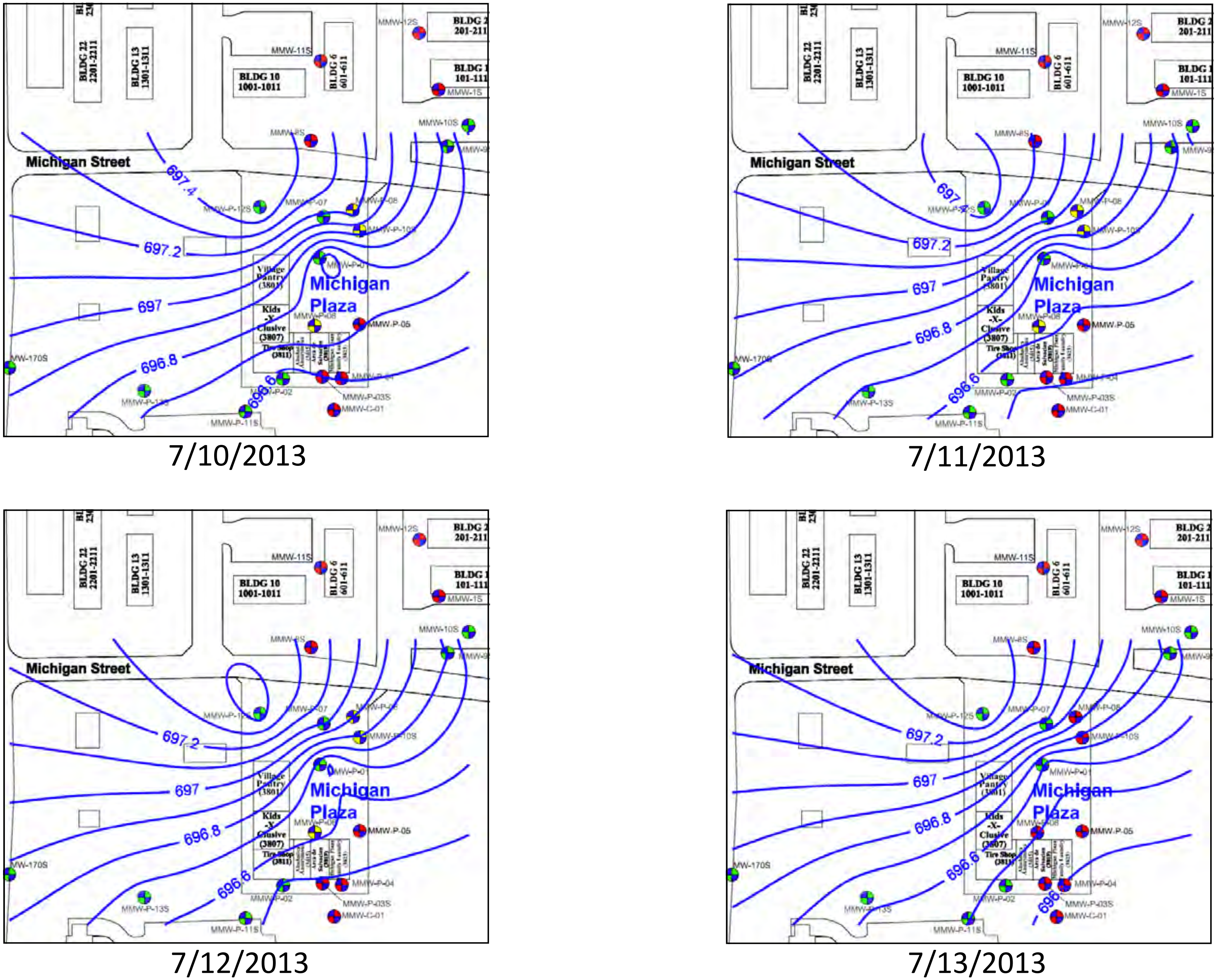
7/8/2013



7/9/2013

Gauged with Transducer   Hand Gauged   Not Gauged

Figure I-3: Daily Potentiometric Maps From July 2013 Injection Event (7/10—7/13)



Gauged with Transducer

Hand Gauged

Not Gauged

Figure I-4: Daily Potentiometric Maps From July 2013 Injection Event (7/14—7/17)

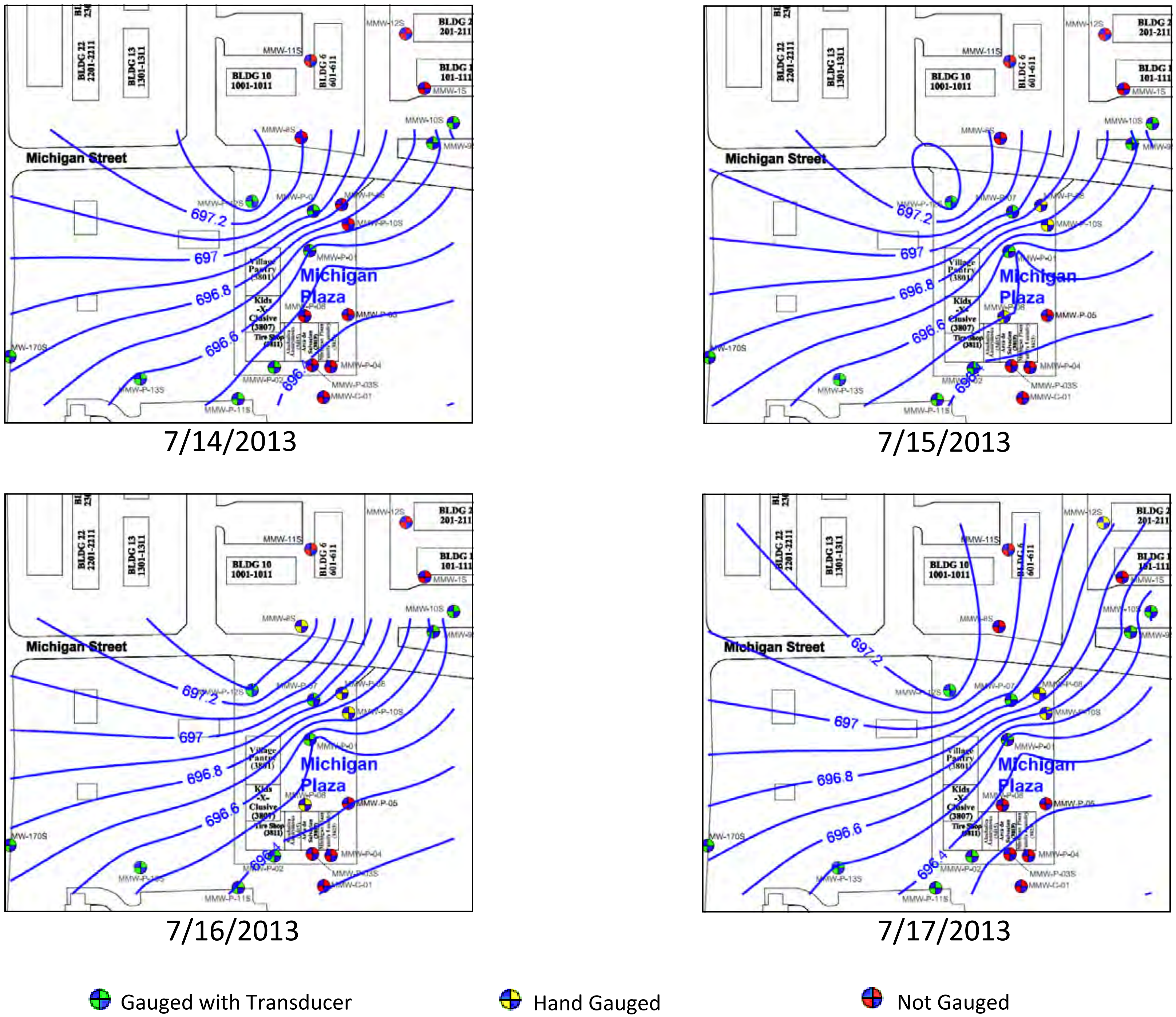
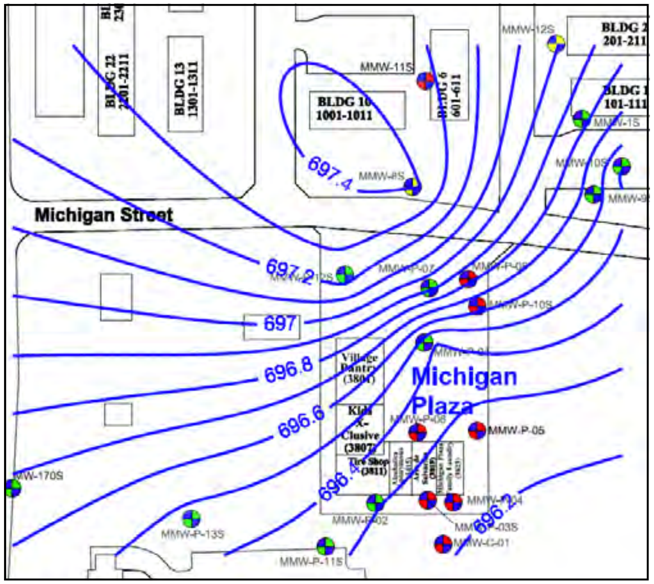
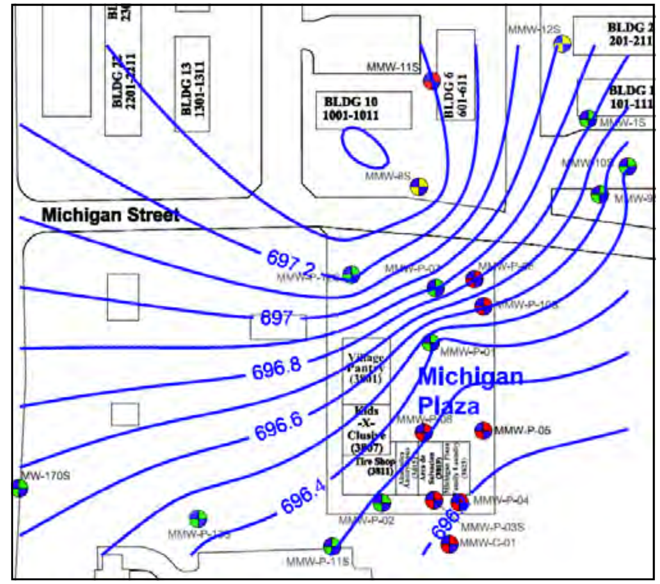


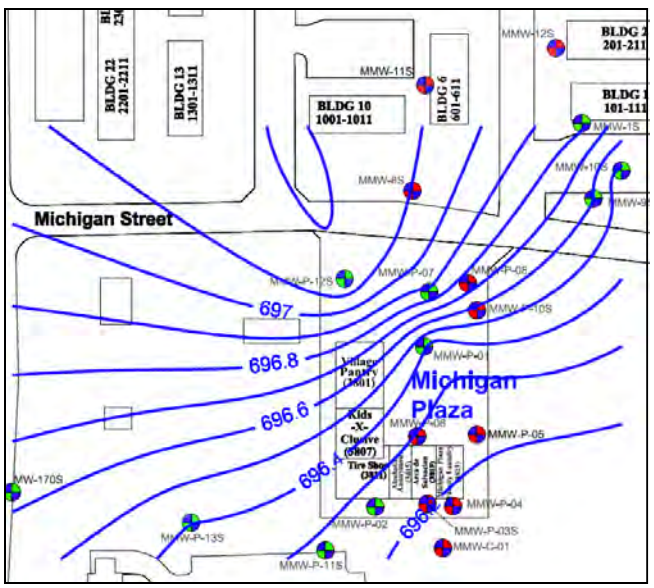
Figure I-5: Daily Potentiometric Maps From July 2013 Injection Event (7/18—7/21)



7/18/2013



7/19/2013



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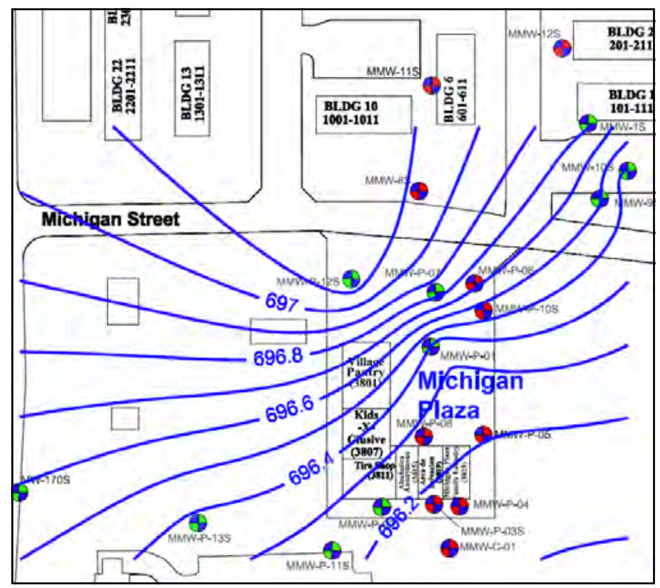


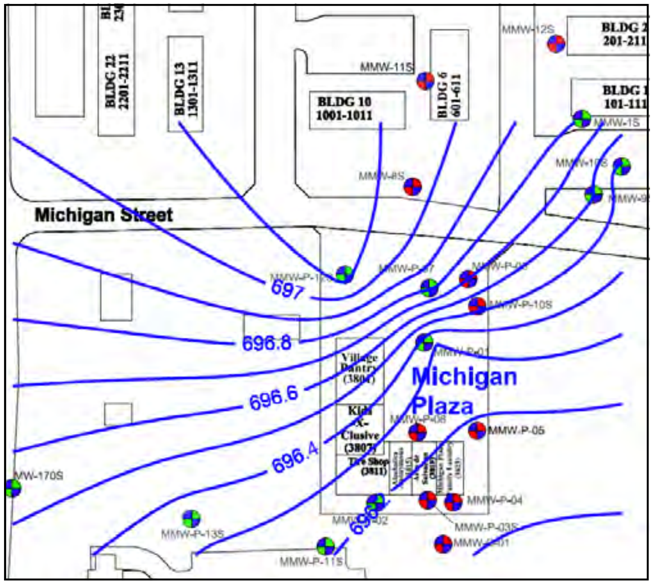
7/21/2013

Gauged with Transducer

Hand Gauged

Not Gauged

Figure I-6: Daily Potentiometric Maps From July 2013 Injection Event (7/22)



7/22/2013

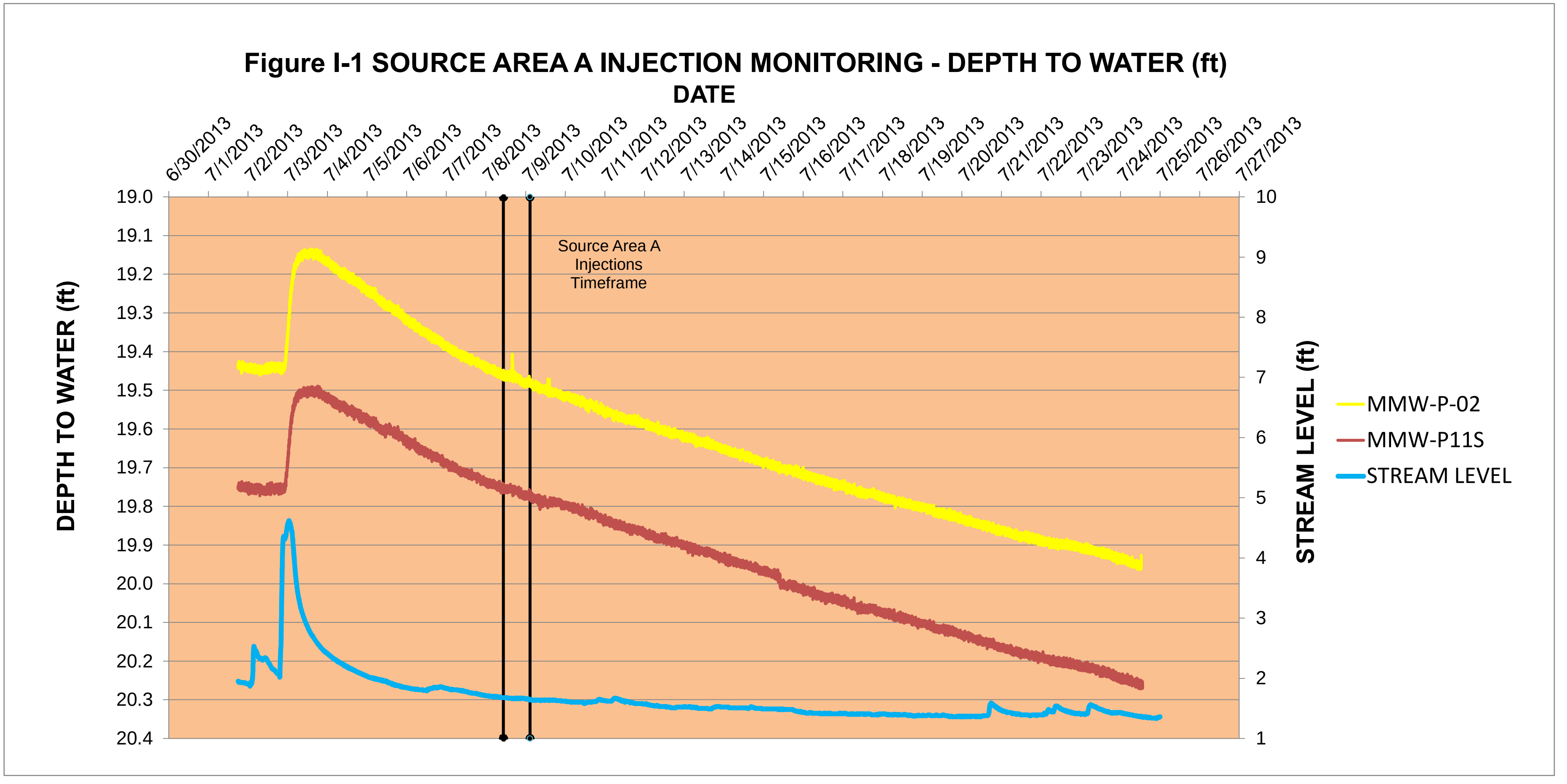


Figure I-1 SOURCE AREA A INJECTION MONITORING - DEPTH TO WATER (ft)
DATE
6/30/2013
7/1/2013
7/2/2013
7/3/2013
7/4/2013
7/5/2013
7/6/2013
7/7/2013
7/8/2013
7/9/2013
7/10/2013
7/11/2013
7/12/2013
7/13/2013
7/14/2013
7/15/2013
7/16/2013
7/17/2013
7/18/2013
7/19/2013
7/20/2013
7/21/2013
7/22/2013
7/23/2013
7/24/2013
7/25/2013
7/26/2013
7/27/2013
DEPTH TO WATER (ft)
19.0
19.1
19.2
19.3
19.4
19.5
19.6
19.7
19.8
19.9
20.0
20.1
20.2
20.3
20.4
STREAM LEVEL (ft)
10
9
8
7
6
5
4
3
2
1
Source Area A
Injections
Timeframe
MMW-P-02
MMW-P11S
STREAM LEVEL

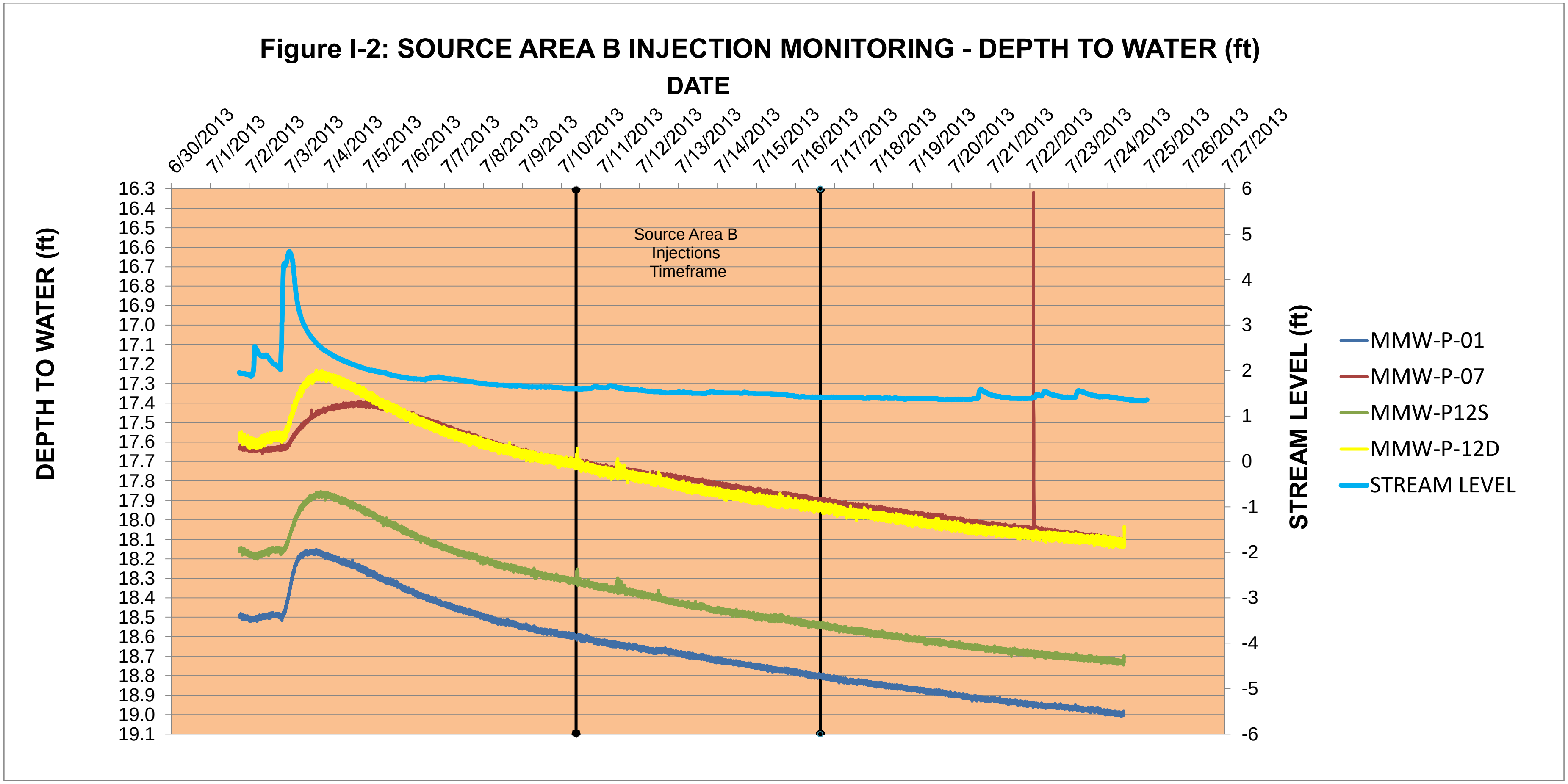
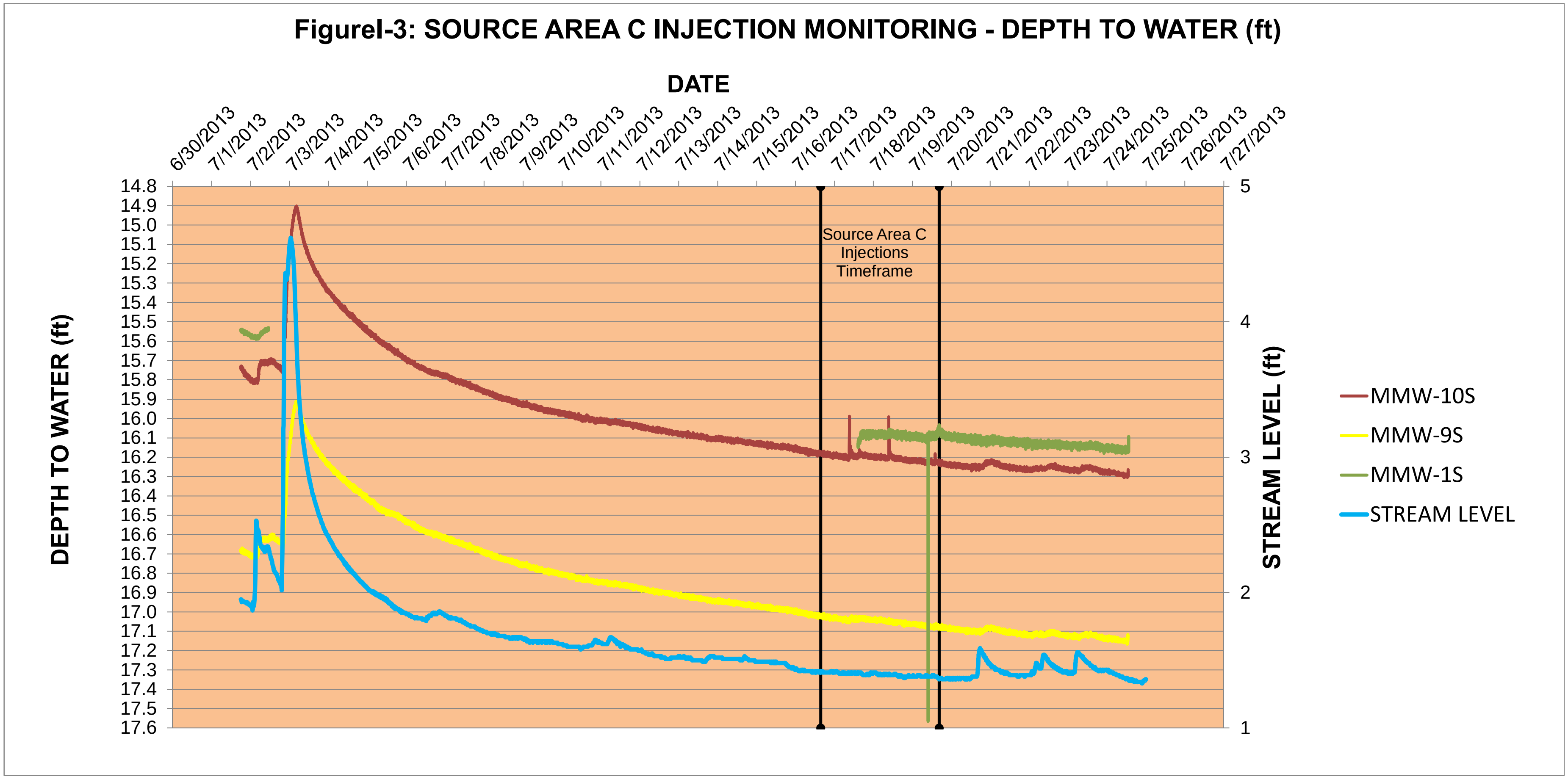


Figure I-2: SOURCE AREA B INJECTION MONITORING - DEPTH TO WATER (ft)
DATE
6/30/2013
7/1/2013
7/2/2013
7/3/2013
7/4/2013
7/5/2013
7/6/2013
7/7/2013
7/8/2013
7/9/2013
7/10/2013
7/11/2013
7/12/2013
7/13/2013
7/14/2013
7/15/2013
7/16/2013
7/17/2013
7/18/2013
7/19/2013
7/20/2013
7/21/2013
7/22/2013
7/23/2013
7/24/2013
7/25/2013
7/26/2013
7/27/2013
DEPTH TO WATER (ft)
16.3
16.4
16.5
16.6
16.7
16.8
16.9
17.0
17.1
17.2
17.3
17.4
17.5
17.6
17.7
17.8
17.9
18.0
18.1
18.2
18.3
18.4
18.5
18.6
18.7
18.8
18.9
19.0
19.1
Source Area B
Injections
Timeframe
STREAM LEVEL (ft)
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
MMW-P-01
MMW-P-07
MMW-P12S
MMW-P-12D
STREAM LEVEL



FigureI-3: SOURCE AREA C INJECTION MONITORING - DEPTH TO WATER (ft)
DATE
6/30/2013
7/1/2013
7/2/2013
7/3/2013
7/4/2013
7/5/2013
7/6/2013
7/7/2013
7/8/2013
7/9/2013
7/10/2013
7/11/2013
7/12/2013
7/13/2013
7/14/2013
7/15/2013
7/16/2013
7/17/2013
7/18/2013
7/19/2013
7/20/2013
7/21/2013
7/22/2013
7/23/2013
7/24/2013
7/25/2013
7/26/2013
7/27/2013
DEPTH TO WATER (ft)
STREAM LEVEL (ft)
Source Area C
Injections
Timeframe
MMW-10S
MMW-9S
MMW-1S
STREAM LEVEL

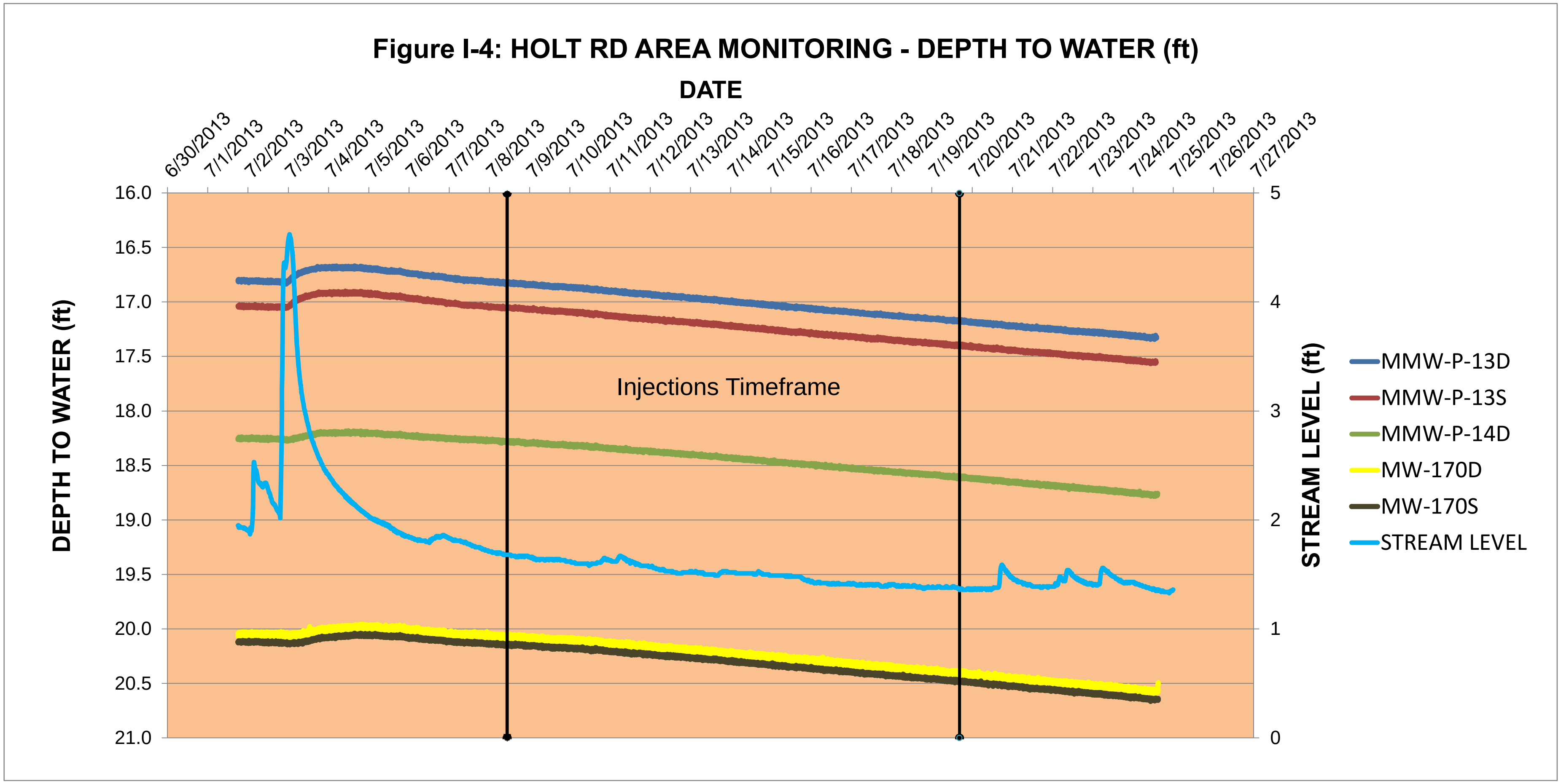


Figure I-4: HOLT RD AREA MONITORING - DEPTH TO WATER (ft)
DATE
6/30/2013
7/1/2013
7/2/2013
7/3/2013
7/4/2013
7/5/2013
7/6/2013
7/7/2013
7/8/2013
7/9/2013
7/10/2013
7/11/2013
7/12/2013
7/13/2013
7/14/2013
7/15/2013
7/16/2013
7/17/2013
7/18/2013
7/19/2013
7/20/2013
7/21/2013
7/22/2013
7/23/2013
7/24/2013
7/25/2013
7/26/2013
7/27/2013
DEPTH TO WATER (ft)
16.0
16.5
17.0
17.5
18.0
18.5
19.0
19.5
20.0
20.5
21.0
STREAM LEVEL (ft)
5
4
3
2
1
0
Injections Timeframe
MMW-P-13D
MMW-P-13S
MMW-P-14D
MW-170D
MW-170S
STREAM LEVEL

APPENDIX J

REMEDIATION COST ANALYSIS

Table 1
Remediation Cost Analysis
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

Remedial Approach	Estimated Time to Closure (Years)	Total Cost
Mobile SVE w/Monitoring[1]	3	$ 548,500.00
Fixed SVE w/Monitoring[2]	3	$ 690,000.00
Soil Excavation w/Monitoring	4	$ 705,500.00
DPVE	4	$ 714,000.00
Pump & Treat	4	$ 831,000.00
No SVE, with Post Injection Monitoring	6	$ 840,000.00

Notes:
1 = MUNDELL owns a system trailer that can be modified slightly and then billed out as used; capital costs for construction of a new system are not needed.

2 = A fixed system to be operated continuously for an extended period of time (1-2 years) warrants construction of a new system (new equipment).

Table 2
Remediation Cost Analysis Detail
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

Remedial Approach			Design Costs	Bid Specifications	System Capital Cost	System-Conveyance Installation/Decommisoning Costs	Rental Costs per Quarter	Quarterly Groundwater Sampling Costs	Annual Groundwater Sampling Cost	Quarterly Treated GW Discharge Fees	Quarterly O&M Costs (excludes IA mitigation)	Total Number of Quarters of System Operation	Estimated Time to Closure (Years)	Total Cost
Mobile SVE w/Monitoring[1]			$ 1,000.00	$ 1,500.00	$ 10,000.00	$ 20,000.00	$ 7,000.00	$ 35,000.00	$ 140,000.00	$ -	$ 5,000.00	8	3	**$ 548,500.00**
Fixed SVE w/Monitoring[2]			$ 5,000.00	$ 5,000.00	$ 50,000.00	$ 130,000.00	$ -	$ 35,000.00	$ 140,000.00	$ -	$ 20,000.00	4	3	**$ 690,000.00**
Soil Excavation w/Monitoring	Building	Excavation/Backfilling			$ 20,000.00									
		Soil Disposal			$ 10,000.00									
		Dewatering			$ 2,500.00									
		Engineering Evaluation			$ 3,000.00									
		Shoring/Load Support Designs			$ 5,000.00									
		Slab Replacement			$ 5,000.00									
	Sewer Line Activities	Sewer Bypass/Repair			$ 25,000.00									
		Excavation/Backfilling			$ 30,000.00									
		Soil Disposal			$ 20,000.00									
		Dewatering			$ 5,000.00									
		Shoring			$ 10,000.00									
		Re-Paving			$ 10,000.00									
		Totals			$ 145,500.00	$ -	$ -	$ 35,000.00	$ 140,000.00	$ -	$ -	0	4	**$ 705,500.00**
DPVE					$ 80,000.00	$ 130,000.00	$ -	$ 35,000.00	$ 140,000.00	$ 500.00	$ 10,000.00	8	3	**$ 714,000.00**
Pump & Treat					$ 100,000.00	$ 75,000.00	$ -	$ 35,000.00	$ 140,000.00	$ 2,000.00	$ 10,000.00	8	4	**$ 831,000.00**
No SVE, with Post Injection Monitoring			$ -	$ -	$ -	$ -	$ -	$ 35,000.00	$ 140,000.00	$ -	$ -	0	6	**$ 840,000.00**

Notes:
1 = MUNDELL owns a system trailer that can be modified slightly and then billed out as used; capital costs for construction of a new system are not needed.
2 = A fixed system to be operated continuously for an extended period of time (1-2 years) warrants construction of a new system (new equipment).

APPENDIX K

CAP18 ME® – 3RD INJECTION (2013) DOCUMENTATION

INJECTION AREA A-1
INJECTION POINT 51

TOTAL VOLUME CAP 18	**15**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**19.38**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 8 / 2013	PERSONELL: BJD / SVE / RSL
START TIME: 10:30 AM	END TIME: 11:20 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**17**	17	**3**	3			
LIFT 2	**20**	20	**3**	3	**300**	300	
LIFT 3	**23**	23	**3**	3	**300**	300	
LIFT 4	**26**	26	**2**	2	**200**	200	
LIFT 5	**29**	29	**2**	2	**100**	100	
LIFT 6	**32**	32	**2**	2	**100**	100	
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**15**	**15**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA A-1
INJECTION POINT 52

TOTAL VOLUME CAP 18	**15**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**19.38**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 8 / 2013	PERSONELL: BJD / SVE / RSL
START TIME: 11:30 AM	END TIME: 12:08 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**17**	17	**3**	3			
LIFT 2	**20**	20	**3**	3	**300**	300	
LIFT 3	**23**	23	**3**	3	**300**	300	
LIFT 4	**26**	26	**2**	2	**200**	200	
LIFT 5	**29**	29	**2**	2	**100**	100	
LIFT 6	**32**	32	**2**	2	**100**	100	
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**15**	**15**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA A-1
INJECTION POINT 53

TOTAL VOLUME CAP 18	**15**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**19.38**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 8 / 2013	PERSONELL: BJD / SVE / RSL
START TIME: 12:15 PM	END TIME: 12:48 PM

LIFT	DEPTH (FT) PLAN	DEPTH (FT) ACTUAL	CAP 18 (GAL) PLAN	CAP 18 (GAL) ACTUAL	BAC-9 (ML) PLAN	BAC-9 (ML) ACTUAL	NOTES
LIFT 1	**17**	17	**3**	3			
LIFT 2	**20**	20	**3**	3	**300**	300	
LIFT 3	**23**	23	**3**	3	**300**	300	
LIFT 4	**26**	26	**2**	2	**200**	200	
LIFT 5	**29**	29	**2**	2	**100**	100	Lift 5: Had some CAP18 coming up borehole; tightened probe rods and resolved problem
LIFT 6	**32**	32	**2**	2	**100**	100	
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**15**	**15**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA A-1
INJECTION POINT 54

TOTAL VOLUME CAP 18	**15**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**19.38**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 9 / 2013	PERSONELL: BJD / SVE / RSL
START TIME: 9:10 AM	END TIME: 9:48 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**17**	17	**3**	3			
LIFT 2	**20**	20	**3**	3	**300**	300	
LIFT 3	**23**	23	**3**	3	**300**	300	
LIFT 4	**26**	26	**2**	2	**200**	200	
LIFT 5	**29**	29	**2**	2	**100**	100	
LIFT 6	**32**	32	**2**	2	**100**	100	
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**15**	**15**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA A-1
INJECTION POINT 55

TOTAL VOLUME CAP 18	**15**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**19.38**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 9 / 2013	PERSONELL: BJD / SVE / RSL
START TIME: 9:54 AM	END TIME: 10:22 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**17**	17	**3**	3			
LIFT 2	**20**	20	**3**	3	**300**	300	
LIFT 3	**23**	23	**3**	3	**300**	300	
LIFT 4	**26**	26	**2**	2	**200**	200	
LIFT 5	**29**	29	**2**	2	**100**	100	
LIFT 6	**32**	32	**2**	2	**100**	100	
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**15**	**15**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA A-1
INJECTION POINT 56

TOTAL VOLUME CAP 18	**15**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**19.38**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 9 / 2013	PERSONELL: BJD / SVE / RSL
START TIME: 10:36 AM	END TIME: 11:06 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**17**	17	**3**	3			
LIFT 2	**20**	20	**3**	3	**300**	300	
LIFT 3	**23**	23	**3**	3	**300**	300	
LIFT 4	**26**	26	**2**	2	**200**	200	
LIFT 5	**29**	29	**2**	2	**100**	100	
LIFT 6	**32**	32	**2**	2	**100**	100	
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**15**	**15**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA A-1
INJECTION POINT 57

TOTAL VOLUME CAP 18	**15**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**19.38**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 8 / 2013	PERSONELL: BJD / SVE / RSL
START TIME: 4:49 PM	END TIME: 5:17 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**17**	17	**3**	3			
LIFT 2	**20**	20	**3**	3	**300**	300	
LIFT 3	**23**	23	**3**	3	**300**	300	
LIFT 4	**26**	26	**2**	2	**200**	200	
LIFT 5	**29**	29	**2**	2	**100**	100	
LIFT 6	**32**	32	**2**	2	**100**	100	
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**15**	**15**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA A-1
INJECTION POINT 58

TOTAL VOLUME CAP 18	**15**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**19.38**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 8 / 2013	PERSONELL: BJD / SVE / RSL
START TIME: 4:15 PM	END TIME: 4:45 PM

LIFT	DEPTH (FT) PLAN	DEPTH (FT) ACTUAL	CAP 18 (GAL) PLAN	CAP 18 (GAL) ACTUAL	BAC-9 (ML) PLAN	BAC-9 (ML) ACTUAL	NOTES
LIFT 1	**17**	17	**3**	3			
LIFT 2	**20**	20	**3**	3	**300**	300	
LIFT 3	**23**	23	**3**	3	**300**	300	
LIFT 4	**26**	26	**2**	2	**200**	200	
LIFT 5	**29**	29	**2**	2	**100**	100	
LIFT 6	**32**	32	**2**	2	**100**	100	
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**15**	**15**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA A-1
INJECTION POINT 59

TOTAL VOLUME CAP 18	**15**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**19.38**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 8 / 2013	PERSONELL: BJD / SVE / RSL
START TIME: 3:46 PM	END TIME: 4:13 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**17**	17.38	**3**	3			
LIFT 2	**20**	20.38	**3**	3	**300**	300	
LIFT 3	**23**	23.38	**3**	3	**300**	300	
LIFT 4	**26**	26.38	**2**	2	**200**	200	
LIFT 5	**29**	29.38	**2**	2	**100**	100	
LIFT 6	**32**	32.38	**2**	2	**100**	100	
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**15**	**15**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA A-1
INJECTION POINT 60

TOTAL VOLUME CAP 18	**15**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**19.38**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 9 / 2013	PERSONELL: BJD / SVE / RSL
START TIME: 11:12 AM	END TIME: 11:48 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**17**	17	**3**	3			
LIFT 2	**20**	20	**3**	3	**300**	300	
LIFT 3	**23**	23	**3**	3	**300**	300	
LIFT 4	**26**	26	**2**	2	**200**	200	
LIFT 5	**29**	29	**2**	2	**100**	100	
LIFT 6	**32**	32	**2**	2	**100**	100	
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**15**	**15**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA A-1
INJECTION POINT 61

TOTAL VOLUME CAP 18	**15**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**19.38**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 9 / 2013	PERSONELL: BJD / SVE / RSL
START TIME: 12:41 PM	END TIME: 1:10 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**17**	17	**3**	3			
LIFT 2	**20**	20	**3**	3	**300**	300	
LIFT 3	**23**	23	**3**	3	**300**	300	
LIFT 4	**26**	26	**2**	2	**200**	200	
LIFT 5	**29**	29	**2**	2	**100**	100	
LIFT 6	**32**	32	**2**	2	**100**	100	
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**15**	**15**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA A-1
INJECTION POINT 62

TOTAL VOLUME CAP 18	**15**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**19.38**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 9 / 2013	PERSONELL: BJD / SVE / RSL
START TIME: 1:13 PM	END TIME: 1:46 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**17**	17	**3**	3			
LIFT 2	**20**	20	**3**	3	**300**	300	
LIFT 3	**23**	23	**3**	3	**300**	300	
LIFT 4	**26**	26	**2**	2	**200**	200	
LIFT 5	**29**	29	**2**	2	**100**	100	
LIFT 6	**32**	32	**2**	2	**100**	100	
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**15**	**15**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA A-1
INJECTION POINT 63

TOTAL VOLUME CAP 18	**15**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**19.38**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 9 / 2013	PERSONELL: BJD / SVE / RSL
START TIME: 1:56 PM	END TIME: 2:36 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**17**	17	**3**	3			
LIFT 2	**20**	20	**3**	3	**300**	300	
LIFT 3	**23**	23	**3**	3	**300**	300	
LIFT 4	**26**	26	**2**	1	**200**	0	Daylighting at 26 ft. Added remaining CAP18 and BAC-9 to Lift 5.
LIFT 5	**29**	29	**2**	3	**100**	300	
LIFT 6	**32**	27	**2**	2	**100**	100	Daylighting at 32 ft. Pulled up and injected remaining CAP 18 and BAC-9 at 27 ft.
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**15**	**15**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED		
ACTUAL TOTAL DEPTH:	29	FEET
ACTUAL TOTAL VOLUME CAP 18:		GALLONS
ACTUAL TOTAL VOLUME BAC-9:		MILLILITERS

INJECTION AREA A-1
INJECTION POINT 64

TOTAL VOLUME CAP 18	**15**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**19.38**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 8 / 2013	PERSONELL: BJD / SVE / RSL
START TIME: 3:10 PM	END TIME: 3:40 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**17**	17	**3**	3			
LIFT 2	**20**	20	**3**	3	**300**	300	
LIFT 3	**23**	23	**3**	3	**300**	300	
LIFT 4	**26**	26	**2**	2	**200**	200	
LIFT 5	**29**	29	**2**	2	**100**	100	
LIFT 6	**32**	32	**2**	2	**100**	100	
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**15**	**15**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA A-1
INJECTION POINT 65

TOTAL VOLUME CAP 18	**15**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**19.38**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 8 / 2013	PERSONELL: BJD / SVE / RSL
START TIME: 2:42 PM	END TIME: 3:10 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**17**	17	**3**	3			
LIFT 2	**20**	20	**3**	3	**300**	300	
LIFT 3	**23**	23	**3**	3	**300**	300	
LIFT 4	**26**	26	**2**	2	**200**	200	
LIFT 5	**29**	29	**2**	2	**100**	100	
LIFT 6	**32**	32	**2**	2	**100**	100	
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**15**	**15**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA A-1
INJECTION POINT 66

TOTAL VOLUME CAP 18	**15**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**19.38**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 8 / 2013	PERSONELL: BJD / SVE / RSL
START TIME: 2:10 PM	END TIME: 2:37 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**17**	17	**3**	3			
LIFT 2	**20**	20	**3**	3	**300**	300	
LIFT 3	**23**	23	**3**	3	**300**	300	
LIFT 4	**26**	26	**2**	2	**200**	200	
LIFT 5	**29**	29	**2**	2	**100**	100	
LIFT 6	**32**	32	**2**	2	**100**	100	
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**15**	**15**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA A-1
INJECTION POINT 67

TOTAL VOLUME CAP 18	**15**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**19.38**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 8 / 2013	PERSONELL: BJD / SVE / RSL
START TIME: 1:43 PM	END TIME: 2:08 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**17**	17	**3**	3			
LIFT 2	**20**	20	**3**	3	**300**	300	
LIFT 3	**23**	23	**3**	3	**300**	300	
LIFT 4	**26**	26	**2**	2	**200**	200	
LIFT 5	**29**	29	**2**	2	**100**	100	
LIFT 6	**32**	32	**2**	2	**100**	100	
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**15**	**15**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-1
INJECTION POINT 24

TOTAL VOLUME CAP 18	**47**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 15 / 2013	PERSONELL: RSL
START TIME: 2:50 PM	END TIME: 3:47 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	15	**7**	7			Encountered hard soil at 15 ft and injected
LIFT 2	**19**	19	**7**	7	**200**	200	
LIFT 3	**22**	22	**7**	7	**200**	200	
LIFT 4	**25**	25	**7**	7	**200**	200	
LIFT 5	**28**	28	**7**	7	**100**	100	
LIFT 6	**31**	31	**6**	6	**100**	100	
LIFT 7	**34**	34	**3**	3	**100**	100	
LIFT 8	**37**	37	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**47**	**47**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-1
INJECTION POINT 25

TOTAL VOLUME CAP 18	**47**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 15 / 2013	PERSONELL: RSL
START TIME: 1:53 PM	END TIME: 2:42 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	16	**7**	6			Daylighting, carried over remaining CAP18 and BAC-9 to next lift
LIFT 2	**19**	19	**7**	2	**200**	0	
LIFT 3	**22**	22	**7**	12	**200**	400	
LIFT 4	**25**	25	**7**	7	**200**	200	
LIFT 5	**28**	28	**7**	7	**100**	100	
LIFT 6	**31**	31	**6**	2	**100**	0	Daylighting, carried over remaining CAP18 and BAC-9 to next lift
LIFT 7	**34**	34	**3**	7	**100**	200	
LIFT 8	**37**	37	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**47**	**47**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-1
INJECTION POINT 26

TOTAL VOLUME CAP 18	**47**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 15 / 2013	PERSONELL: RSL
START TIME: 1:00 PM	END TIME: 1:48 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	16	**7**	6			Daylighting, carried over remaining CAP18 to next lift
LIFT 2	**19**	19	**7**	8	**200**	200	
LIFT 3	**22**	22	**7**	5	**200**	200	Daylighting, carried over remaining CAP18 to next lift
LIFT 4	**25**	25	**7**	9	**200**	200	
LIFT 5	**28**	28	**7**	2	**100**	0	Daylighting, carried over remaining CAP18 and BAC-9 to next lift
LIFT 6	**31**	31	**6**	11	**100**	200	
LIFT 7	**34**	34	**3**	1	**100**	0	Daylighting, carried over remaining CAP18 and BAC-9 to next lift
LIFT 8	**37**	37	**3**	4	**100**	200	
LIFT 9							**Possible that injection rods are leaking
LIFT 10							
		TOTAL	**47**	**47**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-1
INJECTION POINT 27

TOTAL VOLUME CAP 18	**47**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 15 / 2013	PERSONELL: RSL
START TIME: 11:18 AM	END TIME: 12:10 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	16	**7**	7			
LIFT 2	**19**	19	**7**	7	**200**	200	
LIFT 3	**22**	22	**7**	7	**200**	200	
LIFT 4	**25**	25	**7**	7	**200**	200	
LIFT 5	**28**	28	**7**	2	**100**	100	Daylighting, carried over remaining CAP18 to next lift
LIFT 6	**31**	31	**6**	11	**100**	100	
LIFT 7	**34**	34	**3**	1	**100**	0	Daylighting, carried over remaining CAP18 and BAC-9 to next lift
LIFT 8	**37**	37	**3**	5	**100**	200	
LIFT 9							
LIFT 10							
		TOTAL	**47**	**47**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-1

INJECTION POINT 28

TOTAL VOLUME CAP 18	**47**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 15 / 2013	PERSONELL: RSL
START TIME: 10:25 AM	END TIME: 11:15 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	16	**7**	7			
LIFT 2	**19**	19	**7**	7	**200**	200	
LIFT 3	**22**	22	**7**	7	**200**	200	
LIFT 4	**25**	25	**7**	7	**200**	200	
LIFT 5	**28**	28	**7**	4	**100**	100	Daylighting, carried over remaining CAP18 to next lift
LIFT 6	**31**	31	**6**	9	**100**	100	
LIFT 7	**34**	34	**3**	3	**100**	100	
LIFT 8	**37**	37	**3**	3	**100**	100	
LIFT 9							**Drilled to 45 ft, hit clay and pulled back to 37 ft to inject final lift
LIFT 10							
		TOTAL	**47**	**47**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-1
INJECTION POINT 29

TOTAL VOLUME CAP 18	**47**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 15 / 2013	PERSONELL: RSL
START TIME: 9:20 AM	END TIME: Not Recorded

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	16	**7**	7			
LIFT 2	**19**	19	**7**	7	**200**	200	
LIFT 3	**22**	22	**7**	7	**200**	200	
LIFT 4	**25**	25	**7**	7	**200**	200	
LIFT 5	**28**	28	**7**	7	**100**	100	
LIFT 6	**31**	31	**6**	6	**100**	100	
LIFT 7	**34**	34	**3**	3	**100**	100	
LIFT 8	**37**	37	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**47**	**47**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-1
INJECTION POINT 30

TOTAL VOLUME CAP 18	**47**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 12 / 2013	PERSONELL: SVE
START TIME: 3:20 PM	END TIME: 4:10 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	16	**7**	7			
LIFT 2	**19**	19	**7**	7	**200**	200	
LIFT 3	**22**	22	**7**	7	**200**	200	
LIFT 4	**25**	25	**7**	7	**200**	200	
LIFT 5	**28**	28	**7**	7	**100**	100	Injected 0.5 gal CAP18 at 28 ft before daylighting, drilled down to 30 ft and injected remaining CAP18 and all BAC-9
LIFT 6	**31**	31	**6**	6	**100**	100	
LIFT 7	**34**	34	**3**	3	**100**	100	
LIFT 8	**37**	37	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**47**	**47**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-1
INJECTION POINT 31

TOTAL VOLUME CAP 18	**47**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 12 / 2013	PERSONELL: SVE
START TIME: 2:32 PM	END TIME: 3:08 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	16	**7**	7			
LIFT 2	**19**	19	**7**	7	**200**	200	
LIFT 3	**22**	22	**7**	6.5	**200**	200	Daylighting, carried over remaining CAP18 to next lift
LIFT 4	**25**	25	**7**	5.5	**200**	200	
LIFT 5	**28**	28	**7**	9	**100**	100	
LIFT 6	**31**	31	**6**	6	**100**	100	
LIFT 7	**34**	34	**3**	3	**100**	100	
LIFT 8	**37**	37	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**47**	**47**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-1
INJECTION POINT 32

TOTAL VOLUME CAP 18	**47**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 11 / 2013	PERSONELL: BJD / SVE
START TIME: 12:31 PM	END TIME: 1:16 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	16	**7**	7			
LIFT 2	**19**	19	**7**	7	**200**	200	
LIFT 3	**22**	22	**7**	7	**200**	200	
LIFT 4	**25**	25	**7**	7	**200**	200	
LIFT 5	**28**	28	**7**	7	**100**	100	
LIFT 6	**31**	31	**6**	6	**100**	100	
LIFT 7	**34**	34	**3**	3	**100**	100	
LIFT 8	**37**	37	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**47**	**47**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-1

INJECTION POINT 33

TOTAL VOLUME CAP 18	**47**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 11 / 2013	PERSONELL: BJD / SVE
START TIME: 1:22 PM	END TIME: 2:03 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	16	**7**	7			
LIFT 2	**19**	19	**7**	6	**200**	200	Daylighting, carried over remaining CAP18 to next lift
LIFT 3	**22**	22	**7**	8	**200**	200	
LIFT 4	**25**	25	**7**	7	**200**	200	
LIFT 5	**28**	28	**7**	7	**100**	100	
LIFT 6	**31**	31	**6**	6	**100**	100	
LIFT 7	**34**	34	**3**	3	**100**	100	
LIFT 8	**37**	37	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**47**	**47**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-1
INJECTION POINT 34

TOTAL VOLUME CAP 18	**47**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 11 / 2013	PERSONELL: BJD / SVE
START TIME: 2:11 PM	END TIME: 2:52 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	15.79	**7**	7			
LIFT 2	**19**	18.79	**7**	7	**200**	200	
LIFT 3	**22**	21.79	**7**	7	**200**	200	
LIFT 4	**25**	24.79	**7**	7	**200**	200	
LIFT 5	**28**	27.79	**7**	7	**100**	100	
LIFT 6	**31**	30.79	**6**	6	**100**	100	
LIFT 7	**34**	33.79	**3**	3	**100**	100	
LIFT 8	**37**	36.79	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**47**	**47**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED		
ACTUAL TOTAL DEPTH:		FEET
ACTUAL TOTAL VOLUME CAP 18:		GALLONS
ACTUAL TOTAL VOLUME BAC-9:		MILLILITERS

INJECTION AREA B-1
INJECTION POINT 35

TOTAL VOLUME CAP 18	**47**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 12 / 2013	PERSONELL: BJD / SVE / RSL
START TIME: 11:20 AM	END TIME: 12:05 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	15.79	**7**	7			
LIFT 2	**19**	18.79	**7**	7	**200**	200	
LIFT 3	**22**	21.79	**7**	7	**200**	200	
LIFT 4	**25**	24.79	**7**	7	**200**	200	
LIFT 5	**28**	27.79	**7**	7	**100**	100	
LIFT 6	**31**	30.79	**6**	6	**100**	100	
LIFT 7	**34**	33.79	**3**	3	**100**	100	
LIFT 8	**37**	36.79	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**47**	**47**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-1
INJECTION POINT 36

TOTAL VOLUME CAP 18	**47**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 12 / 2013	PERSONELL: SVE
START TIME: 12:12 PM	END TIME: 12:55 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	16	**7**	7			
LIFT 2	**19**	19	**7**	7	**200**	200	
LIFT 3	**22**	22	**7**	7	**200**	200	
LIFT 4	**25**	25	**7**	7	**200**	200	
LIFT 5	**28**	28	**7**	7	**100**	100	
LIFT 6	**31**	31	**6**	6	**100**	100	
LIFT 7	**34**	34	**3**	3	**100**	100	
LIFT 8	**37**	37	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**47**	**47**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-1
INJECTION POINT 37

TOTAL VOLUME CAP 18	**47**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 12 / 2013		PERSONELL: SVE
START TIME: 1:40 PM		END TIME: 2:20 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	16	**7**	7			
LIFT 2	**19**	19	**7**	7	**200**	200	
LIFT 3	**22**	22	**7**	7	**200**	200	
LIFT 4	**25**	25	**7**	7	**200**	200	
LIFT 5	**28**	28	**7**	7	**100**	100	
LIFT 6	**31**	31	**6**	6	**100**	100	
LIFT 7	**34**	34	**3**	3	**100**	100	
LIFT 8	**37**	37	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**47**	**47**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-1
INJECTION POINT 38

TOTAL VOLUME CAP 18	**47**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 11 / 2013	PERSONELL: BJD / SVE
START TIME: 10:53 AM	END TIME: 11:30 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	16	**7**	7			
LIFT 2	**19**	19	**7**	7	**200**	200	
LIFT 3	**22**	22	**7**	7	**200**	200	
LIFT 4	**25**	25	**7**	7	**200**	200	
LIFT 5	**28**	28	**7**	7	**100**	100	
LIFT 6	**31**	31	**6**	6	**100**	100	
LIFT 7	**34**	34	**3**	3	**100**	100	
LIFT 8	**37**	37	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**47**	**47**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-1
INJECTION POINT 39

TOTAL VOLUME CAP 18	**47**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 11 / 2013	PERSONELL: BJD / SVE
START TIME: 10:07 AM	END TIME: 10:48 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	16	**7**	7			
LIFT 2	**19**	19	**7**	7	**200**	200	
LIFT 3	**22**	22	**7**	7	**200**	200	
LIFT 4	**25**	25	**7**	7	**200**	200	
LIFT 5	**28**	28	**7**	7	**100**	100	
LIFT 6	**31**	32	**6**	6	**100**	100	
LIFT 7	**34**	34	**3**	3	**100**	100	
LIFT 8	**37**	37	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**47**	**47**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-1
INJECTION POINT 40

TOTAL VOLUME CAP 18	**47**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 11 / 2013	PERSONELL: BJD / SVE
START TIME: 9:10 AM	END TIME: 9:48 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	16	**7**	7			
LIFT 2	**19**	19	**7**	7	**200**	200	
LIFT 3	**22**	22	**7**	7	**200**	200	
LIFT 4	**25**	25	**7**	7	**200**	200	
LIFT 5	**28**	28	**7**	7	**100**	100	
LIFT 6	**31**	31	**6**	6	**100**	100	
LIFT 7	**34**	34	**3**	3	**100**	100	
LIFT 8	**37**	37	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**47**	**47**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-1
INJECTION POINT 41

TOTAL VOLUME CAP 18	**47**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 10 / 2013	PERSONELL: BJD / SVE
START TIME: 10:44 AM	END TIME: 11:34 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	16	**7**	7			
LIFT 2	**19**	19	**7**	7	**200**	200	
LIFT 3	**22**	22	**7**	7	**200**	200	
LIFT 4	**25**	25	**7**	7	**200**	200	
LIFT 5	**28**	28	**7**	7	**100**	100	
LIFT 6	**31**	31	**6**	6	**100**	100	
LIFT 7	**34**	34	**3**	3	**100**	100	
LIFT 8	**37**	36	**3**	3	**100**	100	Daylighting at 37 ft. Pulled up to 36 ft and injected remaining CAP18.
LIFT 9							
LIFT 10							
		TOTAL	**47**		**1000**		

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-1

INJECTION POINT 42

TOTAL VOLUME CAP 18	**14**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 10 / 2013	PERSONELL: BJD / SVE
START TIME: 8:57 AM	END TIME: 9:33 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	16	**2**	2			
LIFT 2	**19**	19	**2**	2	**200**	200	
LIFT 3	**22**	22	**2**	2	**200**	200	
LIFT 4	**25**	25	**2**	2	**200**	200	
LIFT 5	**28**	28	**2**	1	**100**	0	Daylighting, carried over remaining CAP18 to next lift
LIFT 6	**31**	31	**2**	3	**100**	200	
LIFT 7	**34**	34	**1**	1	**100**	100	
LIFT 8	**37**	35	**1**	1	**100**	100	Daylighting at 37 ft. Pulled up to 35 ft and injected remaining CAP18.
LIFT 9							
LIFT 10							
		TOTAL	**14**	**14**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-1
INJECTION POINT 43

TOTAL VOLUME CAP 18	**14**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 10 / 2013	PERSONELL: BJD / SVE
START TIME: 9:38 AM	END TIME: 10:18 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	16	**2**	2			
LIFT 2	**19**	19	**2**	2	**200**		
LIFT 3	**22**	22	**2**	2	**200**		
LIFT 4	**25**	24.5	**2**	2	**200**		
LIFT 5	**28**	28	**2**	2	**100**		
LIFT 6	**31**	31	**2**	2	**100**		
LIFT 7	**34**	34	**1**	1	**100**		
LIFT 8	**37**	37	**1**	1	**100**		
LIFT 9							
LIFT 10							
		TOTAL	**14**	**14**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-1
INJECTION POINT 44

TOTAL VOLUME CAP 18	**14**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**17.79**	FEET
EXPECTED TOTAL DEPTH	**36**	FEET

DATE: 7 / 10 / 2013	PERSONELL: BJD / SVE
START TIME: 10:23 AM	END TIME: 10:39 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**16**	16	**2**	6			
LIFT 2	**19**	19	**2**	8	**200**	1000	** Changes to injection plan approved by MEB
LIFT 3	**22**	-	**2**	-	**200**	-	
LIFT 4	**25**	-	**2**	-	**200**	-	
LIFT 5	**28**	-	**2**	-	**100**	-	
LIFT 6	**31**	-	**2**	-	**100**	-	
LIFT 7	**34**	-	**1**	-	**100**	-	
LIFT 8	**37**	-	**1**	-	**100**	-	
LIFT 9							
LIFT 10							
		TOTAL	**14**	**14**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED		
ACTUAL TOTAL DEPTH:	19	FEET
ACTUAL TOTAL VOLUME CAP 18:		GALLONS
ACTUAL TOTAL VOLUME BAC-9:		MILLILITERS

INJECTION AREA B-2
INJECTION POINT 45

TOTAL VOLUME CAP 18	**51**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**16.04**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 16 / 2013	PERSONELL: MTB
START TIME: 2:10 PM	END TIME: 3:10 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**7**	7			
LIFT 2	**17**	17	**7**	7	**200**	200	
LIFT 3	**20**	20	**7**	7	**200**	200	
LIFT 4	**23**	23	**7**	7	**100**	100	
LIFT 5	**26**	26	**7**	7	**100**	100	
LIFT 6	**29**	29	**7**	1	**100**	0	
LIFT 7	**32**	32	**3**	10	**100**	200	Daylighting at 36 ft after 1 gallon injected; Pulled up to 35 ft and injected 1 gallon, daylighting; Pulled up to 31 ft and injected remaining 1 gallon
LIFT 8	**35**	35	**3**	4	**100**	100	
LIFT 9	**38**	36	**3**	1	**100**	100	
LIFT 10							
		TOTAL	**51**	**51**	**1000**		

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-2
INJECTION POINT 46

TOTAL VOLUME CAP 18	**51**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**16.04**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 16 / 2013	PERSONELL: MTB
START TIME: 1:05 PM	END TIME: 2:05 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**7**	7			
LIFT 2	**17**	17	**7**	7	**200**	200	
LIFT 3	**20**	20	**7**	7	**200**	200	
LIFT 4	**23**	23	**7**	7	**100**	100	
LIFT 5	**26**	26	**7**	7	**100**	100	
LIFT 6	**29**	29	**7**	1	**100**	0	Daylighting, carried over remaining CAP18 and BAC-9 to next lift
LIFT 7	**32**	32	**3**	9	**100**	200	
LIFT 8	**35**	35	**3**	3	**100**	100	
LIFT 9	**38**	38	**3**	3	**100**	100	Daylighting after 1 gallon injected at 38 ft; pulled up to 36 ft to inject remaining CAP18 and BAC-9
LIFT 10							
		TOTAL	**51**	**51**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-2
INJECTION POINT 47

TOTAL VOLUME CAP 18	**51**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**16.04**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 15 / 2013	PERSONELL: RSL
START TIME: 4:07 PM	END TIME: 4:53 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**7**	7			
LIFT 2	**17**	17	**7**	7	**200**	200	
LIFT 3	**20**	20	**7**	7	**200**	200	
LIFT 4	**23**	23	**7**	2	**100**	0	Daylighting, carried over remaining CAP18 and BAC-9 to next lift
LIFT 5	**26**	26	**7**	12	**100**	200	
LIFT 6	**29**	29	**7**	7	**100**	100	
LIFT 7	**32**	32	**3**	1	**100**	0	Daylighting, carried over remaining CAP18 and BAC-9 to next lift
LIFT 8	**35**	35	**3**	5	**100**	200	
LIFT 9	**38**	38	**3**	3	**100**	200	Extra BAC-9 injected to flush lines at end of day
LIFT 10							
		TOTAL	**51**	**51**	**1000**	**1100**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED		
ACTUAL TOTAL DEPTH:		FEET
ACTUAL TOTAL VOLUME CAP 18:		GALLONS
ACTUAL TOTAL VOLUME BAC-9:	1100	MILLILITERS

INJECTION AREA B-2
INJECTION POINT 48

TOTAL VOLUME CAP 18	**51**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**16.04**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 16 / 2013	PERSONELL: MTB
START TIME: 11:10 AM	END TIME: 12:16 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**7**	7			
LIFT 2	**17**	17	**7**	7	**200**	200	
LIFT 3	**20**	20	**7**	7	**200**	200	
LIFT 4	**23**	23	**7**	7	**100**	100	
LIFT 5	**26**	26	**7**	7	**100**	0	CAP18 was slow to inject; BAC-9 was carried over to the next lift
LIFT 6	**29**	29	**7**	7	**100**	200	
LIFT 7	**32**	32	**3**	3	**100**	100	
LIFT 8	**35**	35	**3**	3	**100**	100	
LIFT 9	**38**	38	**3**	3	**100**	100	
LIFT 10							
		TOTAL	**51**	**51**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-2
INJECTION POINT 49

TOTAL VOLUME CAP 18	**51**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**16.04**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 16 / 2013	PERSONELL: MTB
START TIME: 10:12 AM	END TIME: 11:02 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**7**	7			
LIFT 2	**17**	17	**7**	7	**200**	200	
LIFT 3	**20**	20	**7**	7	**200**	200	
LIFT 4	**23**	23	**7**	7	**100**	100	
LIFT 5	**26**	26	**7**	7	**100**	100	
LIFT 6	**29**	29	**7**	7	**100**	100	
LIFT 7	**32**	32	**3**	3	**100**	100	
LIFT 8	**35**	35	**3**	3	**100**	100	
LIFT 9	**38**	38	**3**	3	**100**	100	
LIFT 10							
		TOTAL	**51**	**51**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA B-2
INJECTION POINT 50

TOTAL VOLUME CAP 18	**51**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**16.04**	FEET
EXPECTED TOTAL DEPTH	**38**	FEET

DATE: 7 / 16 / 2013	PERSONELL: MTB
START TIME: 9:05 AM	END TIME: 10:00 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**7**	7			
LIFT 2	**17**	17	**7**	7	**200**	200	
LIFT 3	**20**	20	**7**	7	**200**	200	
LIFT 4	**23**	23	**7**	7	**100**	100	
LIFT 5	**26**	26	**7**	7	**100**	100	
LIFT 6	**29**	29	**7**	7	**100**	100	
LIFT 7	**32**	32	**3**	3	**100**	100	
LIFT 8	**35**	35	**3**	3	**100**	100	
LIFT 9	**38**	38	**3**	3	**100**	100	
LIFT 10							
		TOTAL	**51**	**51**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA C-1
INJECTION POINT 1

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 19 / 2013	PERSONELL: SVE / RSL
START TIME: 1:11 PM	END TIME: 2:07 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	12			**Extra CAP18 remained by the end of the second week of injections and was distributed over the last few points
LIFT 2	**17**	17	**5**	12	**200**	200	
LIFT 3	**20**	20	**5**	12	**200**	200	
LIFT 4	**23**	23	**5**	12	**200**	200	
LIFT 5	**26**	26	**4**	12	**100**	100	
LIFT 6	**29**	29	**3**	12	**100**	100	
LIFT 7	**32**	32	**3**	12	**100**	100	
LIFT 8	**35**	35	**3**	12	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**33**	**96**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED		
ACTUAL TOTAL DEPTH:		FEET
ACTUAL TOTAL VOLUME CAP 18:	96	GALLONS
ACTUAL TOTAL VOLUME BAC-9:		MILLILITERS

INJECTION AREA C-1
INJECTION POINT 2

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 19 / 2013	PERSONELL: RSL
START TIME: 11:00 AM	END TIME: 11:55 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	10			**Extra CAP18 remained by the end of the second week of injections and was distributed over the last few points
LIFT 2	**17**	18	**5**	10	**200**	200	
LIFT 3	**20**	20	**5**	10.5	**200**	200	
LIFT 4	**23**	23	**5**	10	**200**	200	
LIFT 5	**26**	25	**4**	10	**100**	100	
LIFT 6	**29**	29	**3**	6	**100**	100	
LIFT 7	**32**	32	**3**	6	**100**	100	
LIFT 8	**35**	35	**3**	6	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**33**	**68.5**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED		
ACTUAL TOTAL DEPTH:		FEET
ACTUAL TOTAL VOLUME CAP 18:	68.5	GALLONS
ACTUAL TOTAL VOLUME BAC-9:		MILLILITERS

INJECTION AREA C-1
INJECTION POINT 3

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 19 / 2013	PERSONELL: RSL
START TIME: 9:53 AM	END TIME: 10:45 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	5			
LIFT 2	**17**	18	**5**	5	**200**	200	
LIFT 3	**20**	20	**5**	5	**200**	200	
LIFT 4	**23**	23	**5**	5	**200**	200	
LIFT 5	**26**	26	**4**	4	**100**	100	
LIFT 6	**29**	30	**3**	3	**100**	100	
LIFT 7	**32**	32	**3**	3	**100**	100	
LIFT 8	**35**	35	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**33**	**33**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA C-1
INJECTION POINT 4

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 18 / 2013	PERSONELL: MTB
START TIME: 1:50 PM	END TIME: 2:31 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	5			
LIFT 2	**17**	17	**5**	5	**200**	200	
LIFT 3	**20**	20	**5**	5	**200**	200	
LIFT 4	**23**	23	**5**	5	**200**	200	
LIFT 5	**26**	26	**4**	4	**100**	100	
LIFT 6	**29**	29	**3**	3	**100**	100	
LIFT 7	**32**	32	**3**	3	**100**	100	
LIFT 8	**35**	35	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**33**	**33**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA C-1
INJECTION POINT 5

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 18 / 2013	PERSONELL: MTB
START TIME: 1:05 PM	END TIME: 1:45 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	5			
LIFT 2	**17**	17	**5**	5	**200**	200	
LIFT 3	**20**	20	**5**	5	**200**	200	
LIFT 4	**23**	23	**5**	5	**200**	200	
LIFT 5	**26**	26	**4**	4	**100**	100	
LIFT 6	**29**	29	**3**	3	**100**	100	
LIFT 7	**32**	32	**3**	3	**100**	100	
LIFT 8	**35**	35	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**33**	**33**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA C-1
INJECTION POINT 6

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 17 / 2013	PERSONELL: MTB
START TIME: 4:09 PM	END TIME: 4:53 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	5			
LIFT 2	**17**	17	**5**	5	**200**	200	
LIFT 3	**20**	20	**5**	5	**200**	200	
LIFT 4	**23**	23	**5**	5	**200**	200	
LIFT 5	**26**	26	**4**	4	**100**	100	
LIFT 6	**29**	29	**3**	1	**100**	0	Daylighting, carried over remaining CAP18 and BAC-9 to next lift
LIFT 7	**32**	32	**3**	1	**100**	0	
LIFT 8	**35**	35	**3**	7	**100**	300	
LIFT 9							
LIFT 10							
		TOTAL	**33**	**33**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA **C-1**
INJECTION POINT **7**

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 19 / 2013	PERSONELL: SVE / RSL
START TIME: 2:11 PM	END TIME: 3:06 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	12			
LIFT 2	**17**	18.2	**5**	2	**200**	200	Daylighting, carried over remaining CAP18 to next lift
LIFT 3	**20**	20	**5**	22	**200**	200	
LIFT 4	**23**	23	**5**	0	**200**	0	Daylighting, carried over remaining CAP18 and BAC-9 to next lift
LIFT 5	**26**	26	**4**	24	**100**	300	
LIFT 6	**29**	29	**3**	12	**100**	100	
LIFT 7	**32**	32	**3**	1	**100**	0	Daylighting, carried over remaining CAP18 and BAC-9 to next lift **Extra CAP18 remained by the end of the second week of injections and was distributed over the last few points
LIFT 8	**35**	35	**3**	23	**100**	200	
LIFT 9							
LIFT 10							
		TOTAL	**33**	**96**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED		
ACTUAL TOTAL DEPTH:		FEET
ACTUAL TOTAL VOLUME CAP 18:	96	GALLONS
ACTUAL TOTAL VOLUME BAC-9:		MILLILITERS

INJECTION AREA C-1
INJECTION POINT 8

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 19 / 2013	PERSONELL: RSL
START TIME: 9:00 AM	END TIME: 9:48 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	5			
LIFT 2	**17**	17	**5**	0	**200**	0	Daylighting, carried over remaining CAP18 and BAC-9 to next lift
LIFT 3	**20**	19.5	**5**	10	**200**	400	
LIFT 4	**23**	23	**5**	1	**200**	0	Daylighting (high pressure ~400 psi), carried over remaining CAP18 and BAC-9 to next lift
LIFT 5	**26**	26	**4**	8	**100**	300	
LIFT 6	**29**	29	**3**	1	**100**	0	Daylighting, carried over remaining CAP18 and BAC-9 to next lift
LIFT 7	**32**	32	**3**	5	**100**	200	
LIFT 8	**35**	35	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**33**	**33**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA C-1
INJECTION POINT 9

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 18 / 2013	PERSONELL: MTB
START TIME: 3:21 PM	END TIME: 4:00 PM

LIFT	DEPTH (FT) PLAN	DEPTH (FT) ACTUAL	CAP 18 (GAL) PLAN	CAP 18 (GAL) ACTUAL	BAC-9 (ML) PLAN	BAC-9 (ML) ACTUAL	NOTES
LIFT 1	**14**	14	**5**	5			
LIFT 2	**17**	17	**5**	0.5	**200**	0	Daylighting, carried over remaining CAP18 and BAC-9 to next lift
LIFT 3	**20**	20	**5**	9.5	**200**	400	
LIFT 4	**23**	23	**5**	2	**200**	200	Daylighting, carried over remaining CAP18 and BAC-9 to next lift
LIFT 5	**26**	26	**4**	7	**100**	100	
LIFT 6	**29**	29	**3**	3	**100**	100	
LIFT 7	**32**	33	**3**	3	**100**	100	Daylighting at 32 ft, pushed down to 33 ft
LIFT 8	**35**	35	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**33**	**33**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA C-1
INJECTION POINT 10

TOTAL VOLUME CAP 18	**27**	GALLONS
TOTAL VOLUME BAC-9	**800**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 18 / 2013	PERSONELL: MTB
START TIME: 2:44 PM	END TIME: 3:14 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	5			
LIFT 2	**17**	17	**5**	5	**200**	200	
LIFT 3	**20**	20	**5**	5	**200**	200	
LIFT 4	**23**	23	**5**	5	**200**	200	
LIFT 5	**26**	26	**4**	4	**100**	100	
LIFT 6	**29**	29	**3**	3	**100**	100	
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**27**	**27**	**800**	**800**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA C-1
INJECTION POINT 11

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 19 / 2013	PERSONELL: SVE / RSL
START TIME: 3:10 PM	END TIME: 4:25 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	15	**5**	12			**Extra CAP18 and BAC-9 remained by the end of the second week of injections and was distributed over the last few points
LIFT 2	**17**	17	**5**	15	**200**	500	
LIFT 3	**20**	20	**5**	15	**200**	500	
LIFT 4	**23**	23	**5**	15	**200**	500	
LIFT 5	**26**	26	**4**	8	**100**	700	
LIFT 6	**29**	29	**3**	18	**100**	1300	
LIFT 7	**32**	32	**3**	24	**100**	400	
LIFT 8	**35**	35	**3**	26	**100**	300	
LIFT 9							
LIFT 10							
		TOTAL	**33**	**133**	**1000**	**4200**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED		
ACTUAL TOTAL DEPTH:		FEET
ACTUAL TOTAL VOLUME CAP 18:	133	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	4200	MILLILITERS

INJECTION AREA C-1
INJECTION POINT 12

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 18 / 2013	PERSONELL: MTB
START TIME: 8:59 AM	END TIME: 9:40 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	5			
LIFT 2	**17**	17	**5**	5	**200**	200	
LIFT 3	**20**	20	**5**	5	**200**	200	
LIFT 4	**23**	23	**5**	5	**200**	200	
LIFT 5	**26**	26	**4**	4	**100**	100	
LIFT 6	**29**	29	**3**	3	**100**	100	
LIFT 7	**32**	32	**3**	3	**100**	100	
LIFT 8	**35**	35	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**33**	**33**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA C-1
INJECTION POINT 13

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 18 / 2013	PERSONELL: MTB
START TIME: 9:45 AM	END TIME: 10:28 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	5			
LIFT 2	**17**	17	**5**	5	**200**	200	
LIFT 3	**20**	20	**5**	5	**200**	200	
LIFT 4	**23**	23	**5**	5	**200**	200	
LIFT 5	**26**	26	**4**	4	**100**	100	
LIFT 6	**29**	29	**3**	3	**100**	100	
LIFT 7	**32**	32	**3**	3	**100**	100	
LIFT 8	**35**	35	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**33**	**33**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA C-1
INJECTION POINT 14

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 18 / 2013	PERSONELL: MTB
START TIME: 10:34 AM	END TIME: 11:13 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	5			
LIFT 2	**17**	17	**5**	5	**200**	200	
LIFT 3	**20**	20	**5**	5	**200**	200	
LIFT 4	**23**	23	**5**	5	**200**	200	
LIFT 5	**26**	26	**4**	4	**100**	100	
LIFT 6	**29**	29	**3**	3	**100**	100	
LIFT 7	**32**	32	**3**	3	**100**	100	
LIFT 8	**35**	35	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**33**	**33**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA C-1
INJECTION POINT 15

TOTAL VOLUME CAP 18	**27**	GALLONS
TOTAL VOLUME BAC-9	**800**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 18 / 2013	PERSONELL: MTB
START TIME: 11:30 AM	END TIME: 12:05 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	4			Daylighting, carried over remaining CAP18 and to next lift
LIFT 2	**17**	17	**5**	6	**200**	200	
LIFT 3	**20**	20	**5**	5	**200**	200	
LIFT 4	**23**	23	**5**	5	**200**	200	
LIFT 5	**26**	26	**4**	5	**100**	100	Daylighting at 29 ft after 1 gallon CAP18 and 100mL BAC-9; pulled up and injected 1 gallon at 28 ft until more daylighting; pulled up and injected final gallon at 26 ft
LIFT 6	**29**	29	**3**	2	**100**	100	
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**27**	**27**	**800**	**800**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA C-1
INJECTION POINT 16

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 16 / 2013	PERSONELL: MTB
START TIME: 3:27 PM	END TIME: 4:08 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	5			
LIFT 2	**17**	17	**5**	5	**200**	200	
LIFT 3	**20**	20	**5**	5	**200**	200	
LIFT 4	**23**	23	**5**	5	**200**	200	
LIFT 5	**26**	26	**4**	4	**100**	100	
LIFT 6	**29**	29	**3**	3	**100**	100	
LIFT 7	**32**	32	**3**	3	**100**	100	
LIFT 8	**35**	35	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**33**	**33**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA C-1
INJECTION POINT 17

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 17 / 2013	PERSONELL: MTB
START TIME: 4:12 PM	END TIME: Not Recorded

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	5			
LIFT 2	**17**	17	**5**	5	**200**	200	
LIFT 3	**20**	20	**5**	5	**200**	200	
LIFT 4	**23**	23	**5**	1	**200**	0	Daylighting, carried over remaining CAP18 and BAC-9 to next lift
LIFT 5	**26**	26	**4**	8	**100**	300	
LIFT 6	**29**	29	**3**	1	**100**	0	Daylighting, carried over remaining CAP18 and BAC-9 to next lift
LIFT 7	**32**	32	**3**	5	**100**	200	
LIFT 8	**35**	35 (37)	**3**	1	**100**	100	Daylighting at 35 ft after injecting one gallon CAP18, drilled down to 37 ft and injected final 2 gallons CAP18
LIFT 9							
LIFT 10							
		TOTAL	**33**	**33**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED		
ACTUAL TOTAL DEPTH:	37	FEET
ACTUAL TOTAL VOLUME CAP 18:		GALLONS
ACTUAL TOTAL VOLUME BAC-9:		MILLILITERS

INJECTION AREA C-1
INJECTION POINT 18

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 17 / 2013	PERSONELL: MTB
START TIME: 11:39 AM	END TIME: 12:24 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	5			
LIFT 2	**17**	17	**5**	5	**200**	200	
LIFT 3	**20**	20	**5**	5	**200**	200	
LIFT 4	**23**	23	**5**	5	**200**	200	
LIFT 5	**26**	26	**4**	4	**100**	100	
LIFT 6	**29**	29	**3**	3	**100**	100	
LIFT 7	**32**	32	**3**	3	**100**	100	
LIFT 8	**35**	35	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**33**	**33**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA C-1
INJECTION POINT 19

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 17 / 2013	PERSONELL: MTB
START TIME: 1:20 PM	END TIME: 2:08 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	5			
LIFT 2	**17**	17	**5**	5	**200**	200	
LIFT 3	**20**	20	**5**	5	**200**	200	
LIFT 4	**23**	23	**5**	5	**200**	200	
LIFT 5	**26**	26	**4**	4	**100**	100	
LIFT 6	**29**	29	**3**	3	**100**	100	
LIFT 7	**32**	32	**3**	3	**100**	100	
LIFT 8	**35**	35	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**33**	**33**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA C-1
INJECTION POINT 20

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 17 / 2013	PERSONELL: MTB
START TIME: 2:13 PM	END TIME: 2:54 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	5			
LIFT 2	**17**	17	**5**	5	**200**	200	
LIFT 3	**20**	20	**5**	5	**200**	200	
LIFT 4	**23**	23	**5**	5	**200**	200	
LIFT 5	**26**	26	**4**	4	**100**	100	
LIFT 6	**29**	29	**3**	3	**100**	100	
LIFT 7	**32**	32	**3**	3	**100**	100	
LIFT 8	**35**	35	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**33**	**33**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA C-1
INJECTION POINT 21

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 17 / 2013	PERSONELL: MTB
START TIME: 10:42 AM	END TIME: 11:27 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	5			
LIFT 2	**17**	17	**5**	5	**200**	200	
LIFT 3	**20**	20	**5**	5	**200**	200	
LIFT 4	**23**	23	**5**	5	**200**	200	
LIFT 5	**26**	26	**4**	4	**100**	100	
LIFT 6	**29**	29	**3**	3	**100**	100	
LIFT 7	**32**	32	**3**	3	**100**	100	
LIFT 8	**35**	35	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**33**	**33**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA C-1
INJECTION POINT 22

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 17 / 2013	PERSONELL: MTB
START TIME: 9:51 AM	END TIME: 10:38 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	5			
LIFT 2	**17**	17	**5**	5	**200**	200	
LIFT 3	**20**	20	**5**	4	**200**	200	Daylighting, carried over remaining CAP18 to next lift
LIFT 4	**23**	23	**5**	5	**200**	200	
LIFT 5	**26**	26	**4**	5	**100**	100	
LIFT 6	**29**	29	**3**	3	**100**	100	
LIFT 7	**32**	32	**3**	1.5	**100**	0	Daylighting, carried over remaining CAP18 and BAC-9 to next lift
LIFT 8	**35**	35	**3**	4.5	**100**	200	
LIFT 9							
LIFT 10							
		TOTAL	**33**	**33**	**1000**	**1000**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA C-1
INJECTION POINT 23

TOTAL VOLUME CAP 18	**33**	GALLONS
TOTAL VOLUME BAC-9	**1000**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 17 / 2013	PERSONELL: MTB
START TIME: 9:00 AM	END TIME: 9:48 AM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**5**	5			
LIFT 2	**17**	17	**5**	5	**200**	200	
LIFT 3	**20**	20	**5**	5	**200**	200	
LIFT 4	**23**	23	**5**	5	**200**	200	
LIFT 5	**26**	26	**4**	4	**100**	100	
LIFT 6	**29**	29	**3**	2.5	**100**	0	Daylighting at 29 ft after injecting one gallon CAP18; pulled up to 28 ft and injected 1 gallon CAP18 - daylighting; drilled down to 30 ft and injected 0.5 gallons CAP18 - daylighting. Carried remaining 0.5 gallons over to the next lift.
LIFT 7	**32**	32	**3**	3.5	**100**	200	
LIFT 8	**35**	35	**3**	3	**100**	100	
LIFT 9							
LIFT 10							
		TOTAL	**33**		**1000**		

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA C-1
INJECTION POINT 23A

TOTAL VOLUME CAP 18	**6**	GALLONS
TOTAL VOLUME BAC-9	**200**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 17 / 2013	PERSONELL: MTB
START TIME: 3:40 PM	END TIME: 3:53 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**3**	3			
LIFT 2	**17**	17	**3**	3	**200**	200	
LIFT 3							
LIFT 4							
LIFT 5							
LIFT 6							
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**6**	**6**	**200**	**200**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

INJECTION AREA C-1
INJECTION POINT 23B

TOTAL VOLUME CAP 18	**6**	GALLONS
TOTAL VOLUME BAC-9	**200**	MILLILITERS
DEPTH TO WATER	**15.99**	FEET
EXPECTED TOTAL DEPTH	**34**	FEET

DATE: 7 / 17 / 2013	PERSONELL: MTB
START TIME: 3:20 PM	END TIME: 3:37 PM

LIFT	DEPTH (FT)		CAP 18 (GAL)		BAC-9 (ML)		NOTES
	PLAN	ACTUAL	PLAN	ACTUAL	PLAN	ACTUAL	
LIFT 1	**14**	14	**3**	3			
LIFT 2	**17**	17	**3**	3	**200**	200	
LIFT 3							
LIFT 4							
LIFT 5							
LIFT 6							
LIFT 7							
LIFT 8							
LIFT 9							
LIFT 10							
		TOTAL	**6**	**6**	**200**	**200**	

ACTUAL TOTALS IF DIFFERENT FROM PLANNED	
ACTUAL TOTAL DEPTH:	FEET
ACTUAL TOTAL VOLUME CAP 18:	GALLONS
ACTUAL TOTAL VOLUME BAC-9:	MILLILITERS

110 South Downey Avenue, Indianapolis, Indiana 46219-6406
Telephone 317-630-9060, Facsimile 317-630-9065
www.MundellAssociates.com

February 20, 2013

Mr. Corey Webb
Section Chief
Voluntary Remediation Program
Office of Land Quality
100 North Senate Avenue
Indianapolis, Indiana 46204

Re: ***Second Revised Work Plan for the Third Round of CAP18 ME™ Injections* and Interim Remediation Alternative Description Summary**
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana 46222
IDEM Incident # 0000198
IDEM VRP # 6061202
MUNDELL Project No. M01046

Dear Mr. Webb:

Per discussions at our February 7, 2013, meeting with staff from the Indiana Department of Environmental Management (IDEM), on behalf of AMMH, we are pleased to submit a *Second Revised Work Plan for the Third Round of CAP18 ME™ Injections ("Second Revised Work Plan")). The Second Revised Work Plan* is nearly identical to the *Revised Work Plan for the Third Round of CAP18 ME™ submitted to IDEM on May 2, 2012, except that additional injection locations have been added in some areas of the chemical source areas to provide more complete treatment of remaining chlorinated solvents.*

At the suggestion of your staff, below we have summarized the Work Plan's key components. This summary has been prepared in a format recommended by your staff to succinctly outline the interim remedial alternative being implemented at Michigan Plaza, the goals of the remedy, the data that will be collected to determine its effectiveness, and the steps that will be taken if the remedial goals are not being met.

WHAT REMEDY WILL BE USED?

The remedy selected for treatment of groundwater impacts is in-situ bioremediation followed by monitored natural attenuation (MNA). This involves the injection of a bioremediation catalyst, CAP18 ME™, a refined, food-grade soybean oil into groundwater that stimulates anaerobic bioremediation of chlorinated solvents via a reductive dechlorination pathway.

Why Was the Remedy Chosen?

The remedy was selected because of its proven effectiveness in treating chlorinated solvent impacts in groundwater. The primary advantages of this technology are that it is non-disruptive in nature, does not require on-going maintenance activities and does not present a threat to human health or environmental quality since the soybean oil is food-grade quality. Since impacted groundwater is not removed from the subsurface or treated and then discharged above the ground surface, there are no concerns with direct contact with the water, and as such, no possibility of direct human or ecological exposure. Since the product is food-grade quality, a health risk associated with either dermal contact or ingestion is not present, even during injection. In addition to the decreased risk of environmental impact by using this method, it also causes essentially no disturbance to the Site and surrounding area, which is desirable since there are active business operations, street traffic, and residential apartments near the soil and groundwater impacts.

Where Will the Remedy Be Applied?

The remedy will be applied to the three previously identified and delineated chemical source areas (**Source Areas A**, **B** and **C**) located on the Michigan Plaza property and at the southern end of the Maple Creek Village property. The source areas are associated with the releases of perchloroethylene (PCE) from previous dry cleaning operations at the former Accent Cleaners, which operated on the Michigan Plaza property prior to AMMH's acquisition of the property in 1999. **S*ource Area A*** is located at the Michigan Plaza building in the vicinity of a former dry cleaner and its connecting sewer line. ***Source Area B*** is along the same sewer line near the northern Michigan Plaza property line and extends immediately north of Michigan Street at the sewer line junction with the main east-west sewer. ***Source Area C*** is located further east along the east-west sewer line in the southeast corner of the Maple Creek Village apartments, immediately west, north and south of Apartment Building No. 1.

MUNDELL performed the initial CAP18^{TM} injection in August 2007, with a second 'booster' CAP18^{TM} ME^{TM} injection completed in February 2009.

How Will the Remedy Be Applied?

The technology will be applied through a series of CAP18 ME^{TM} injections into the subsurface using a Geoprobe rig under the supervision of MUNDELL. A detailed description of the specific methods utilized is provided in the attachment to this summary document.

WHAT IS THE GOAL OF THE REMEDY?

The goal of the groundwater remediation is to achieve significant chemical source reduction through the biotransformation of PCE and its breakdown daughter products trichloroethylene (TCE), cis-1,2-Dichlorothene (cis-1,2-DCE) and Vinyl Chloride (VC) to carbon dioxide and water, thereby achieving groundwater concentrations that are at acceptable regulatory levels protective of human health and the environment. In addition, this will also result in acceptable concentrations of these same chemicals in the indoor air of the Michigan Plaza building and the nearby Maple Creek Village apartment buildings. Specific cleanup criteria for soil, groundwater and indoor air will be set forth in a Revised Remediation Work Plan submitted to and approved by IDEM.

How Will the Remedy Achieve the Goal?

The remediation will occur through biochemical reactions known as the reductive dechlorination process.

What are the Remedial Cleanup Criteria?

The remedial cleanup criteria will be submitted in a Revised Remediation Work Plan during the 2nd Quarter of 2013.

WHAT DATA WILL BE USED TO DETERMINE IF/WHEN THE REMEDY IS EFFECTIVE?

Soil data previously collected during the investigation phases of the Michigan Plaza site beneath the plaza building and adjacent to the impacted area beneath the sewer line will be used to determine the achievement of soil closure goals. Confirmation sampling by IDEM in selected areas may be completed to further demonstrate achievement of remediation goals. Groundwater data collected during the historical and ongoing quarterly monitoring events will be used to determine the effectiveness of the groundwater remediation efforts. Vapor mitigation system data from seven (7) operating systems and indoor air quality data from the plaza building and three Maple Creek Village apartment buildings will be used to assess the cleanups effectiveness for achieving acceptable indoor air.

The groundwater data indicating the levels of PCE, TCE, cis-1,2-DCE and VC from both upgradient and downgradient monitoring wells will be analyzed for absolute concentration values and trends to assess the status of the remediation.

What are the Monitoring Parameters?

Groundwater samples will be tested for the shorter list of shorter list of Volatile Organic Compound (VOC) analysis (PCE, TCE, Cis-1,2-DCE, VC) utilizing U.S. EPA SW-846 Method 8260. The in-situ geochemical parameters temperature, pH, dissolved oxygen, conductivity and oxidation-reduction potential will be measured using the Troll 9500 multi-parameter meter to help determine if conditions naturally conducive to natural attenuation continue to exist in the aquifer. Additional aquifer parameters, consisting of nitrate/nitrite (EPA 353.2), sulfate (ASTM D512-90,02), ferrous iron (field test - 1,10 Phenanthroline), total organic carbon (SM 5310C), methane (AM20GAX), ethane (AM20GAX) and ethene (AM20GAX) will be analyzed to evaluate indicator compound breakdown and redox-sensitivity. Finally, volatile fatty acids (VFA) will be tested to evaluate the bioremediation substrate CAP18 ME™ distribution and lifetime duration of the substrate product.

Vapor mitigation stack air samples and indoor air samples will be tested for the shorter list of VOCs using Method AM4.02.

What is the Sampling Frequency?

The sampling frequency for groundwater and vapor mitigation air samples will continue to be on a quarterly basis. The frequency for indoor air is currently completed on an annual basis.

When Will the Results Be Submitted to IDEM?

The results will be provided to IDEM in the Quartering Monitoring Reports submitted at the end of the month following each sampling quarter.

How Will the Monitoring Data be Evaluated?

The data will be provided in both tables and graphical form (trend charts) and will be compared to both the remedial goals and the upgradient groundwater quality. Active remedial action at the Site will conclude with demonstration through confirmation sampling that applicable remedial cleanup criteria, as set forth in an approved Remediation Work Plan.

WHAT HAPPENS IF THE REMEDIAL GOAL IS NOT MET BY THE REMEDY?

If the goals have not been achieved, further analysis will be conducted to determine the reason behind the observed behavior of the remaining chlorinated plumes and what, if any, active remedial action steps can be conducted to achieve the goals.

How is This Evaluated?

This data will be reviewed and analyzed using statistical methods to demonstrate the chlorinated plumes are stable or decreasing. In addition, if necessary, groundwater and air transport modeling will be completed to demonstrate that the plumes will not pose unacceptable risk to human health and the environment. Reviews of in-situ geochemical parameters will be made to determine if the bioremediation processes are still active and effective, and if additional chemical source area specific injections may be beneficial. Site-specific soil gas, indoor air and vapor mitigation system stack air sample results will be analyzed to determine if the remedial goals are being met, or that site-specific adjustments to those goals can be made in light of actual exposures. Finally, additional site-specific engineering and institutional controls will be considered as part of a formal closure strategy if it is deemed necessary.

When Will This Be Evaluated?

This data will be reviewed and evaluated on a quarterly basis as it is generated. In order to allow sufficient time for the new injections to work, absent unusual circumstances, we would not expect to re-evaluate the need for more specific action until at least 12 months after the injection.

What Steps are in Place to Correct the Situation?

If sufficient remedial progress has not been made, or if the remedial goals have not been achieved, MUNDELL, together with AMMH, will meet with IDEM to discuss specific action steps to meet cleanup progress objectives or achieve the remedial goals. If necessary and appropriate, additional injections will be considered as part of the strategy.

CLOSING

We appreciate the opportunity to provide this information to IDEM and look forward to IDEM's approval for implementation. If you should have any questions, please do not hesitate to contact us at (317) 630-9060 or via email (jmundell@MundellAssociates.com; mbreting@MundellAssociates.com).

Sincerely,
MUNDELL & ASSOCIATES, INC.

Mark E. Breting

Mark E. Breting, L.P.G.
Senior Project Geologist

John A. Mundell

John A. Mundell, P.E., L.P.G.
President/Senior Environmental Consultant

/jam

Attachment 1:
Second Revised Work Plan for the Third Round of CAP18 ME™ Injections

cc: Mr. Peter Cappel, AMMH

ATTACHMENT 1

February 20, 2013 Second Revised Work Plan for the Third Round of CAP18 ME^{TM} Injections

110 South Downey Avenue, Indianapolis, Indiana 46219-6406
Telephone 317-630-9060, Facsimile 317-630-9065
www.MundellAssociates.com

February 20, 2013

Mr. Corey Webb
Section Chief
Voluntary Remediation Program
Office of Land Quality
100 North Senate Avenue
Indianapolis, Indiana 46204

Re: **Second Revised Work Plan for Third Round of CAP 18 ME^{TM} Injections**
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana 46222
IDEM Incident # 0000198
IDEM VRP # 6061202
MUNDELL Project No. M01046

Dear Mr. Webb:

This *Second Revised Work Plan for the Third Round of CAP18 ME^{TM} Injections* is being submitted to the Indiana Department of Environmental Management (IDEM) by MUNDELL & ASSOCIATES, INC. (MUNDELL), on behalf of AMMH, to describe and seek IDEM approval for upcoming remediation activities at the Site. The revisions to the previous work plan have been made based on data gathered from the additional wells installed across the study area in 2011, and subsequent quarterly monitoring conducted during 2012. The following sections provide detailed discussions regarding the design of this third and (anticipated) final CAP 18 ME^{TM} injection at the Site. Previous CAP 18 ME^{TM} injections were completed at the Site in August 2007 and February 2009.

The concentration trends of tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride (VC) in ***Source Areas A, B, and C*** at the Site have indicated that dechlorination of the chemicals is still occurring (refer to the *Quarterly Monitoring Progress Report – 4th Quarter 2011* dated January 31, 2012, for specific data summaries and figures). The locations of ***Source Areas A, B, and C*** are included in this Second Revised Work Plan (**Figure 1** and **Figure 2**).

Based on a review of the analytical data, it appears that complete dechlorination of all of the PCE is not occurring in ***Source Areas A, B, and C***, as observed in the concentration trends observed in monitoring wells MMW-P-02, MMW-C-01, and MMW-P-11S, (***Source Area A***), MMW-8S, MMW-P-12S, and MMW-P-12D (***Source Area B***), and MMW-1S, MMW-9S, and MMW-10S (***Source Area C***). It is MUNDELL's opinion that additional enhanced in-situ biodegradation efforts and the injection of additional CAP 18 ME™ product are required in these areas.

CAP 18 ME™ BIOREMEDIATION DESIGN AND IMPLEMENTATION

CAP 18 ME™ Design

The amount and distribution of CAP 18 ME™ needed for each area to be injected (***Injection Areas)*** was designed taking several factors into account as well as the practical experience of the manufacturers of CAP 18 ME™, the Carus Corporation (Carus). The amount of CAP 18 ME™ to inject into the ***Injection Areas*** was calculated using the *CAP 18™ and CAP 18 ME™ Anaerobic Bioremediation Products Design Software* provided by Carus. This software takes into account the treatment area volume (based on plume size) and the soil characteristics (type, bulk density, fraction of organic carbon, total and effective porosity, hydraulic gradient and conductivity). The spreadsheet then calculates the dissolved and sorbed contaminant demand, as well as the background demand from geochemical parameters (*i.e.,* the site levels of dissolved oxygen, nitrate, manganese, iron, sulfate and hardness). These parameters then factor into the stoichiometric demand for hydrogen, and the corresponding amount of CAP 18 ME™ needed for a particular treatment area. Microbial degradation and design contingency factors of safety are considered as well in the calculations.

For this site, a factor of safety of 2 was selected to allow for degradation and design uncertainties. Spreadsheet assumptions for the calculation of demand for CAP 18 ME™ for each ***Injection Area*** are shown in **Table 1**. Computations estimated that approximately 2,011 lbs, 6,821 lbs, 2,265 lbs, and 5,902 lbs of CAP 18 ME™ are needed for ***Injection Areas A-1, B-1, B-2*** and ***C-1***, respectively, based on the cumulative indicator compound concentrations and geochemistry parameters obtained (predominantly) during 2011 and 2012 quarterly sampling events.

Several iterations of CAP 18 ME™ injection distribution were evaluated using the *Bioremediation Products Design Software* and considering Site physical features. The first consideration was to determine what type of application would best fit the remaining plume's size and distribution in each ***Source Area*** given the geology, geochemistry and indicator compounds. The saturated zone within each ***Source Area*** has poorly-graded, medium sand (SP) underlain by well-graded, gravelly sand (SW).

MUNDELL's experience with CAP 18 ME™ in sands at the Michigan Plaza Site confirms that fatty acids that are broken down through beta-oxidation can travel distances as great as 75 ft to 100 ft from the place of injection, thereby allowing “treatment” to continue hydraulically downgradient as the fatty acids migrate and continue to lend hydrogen atoms for reductive dechlorination. Given this geologic advantage and the plumes being situated as they are in relation to Michigan Street and the Plaza strip mall, it was determined that a ‘treatment curtain’ design distribution would be effective.

The injection spacing for the selected design is largely determined by the aquifer’s ability to receive the product. An injection spacing of 10 ft to 15 ft on centers is considered very effective for the sands encountered at the Site. Curtain ‘rows’ stacked three deep are planned for ***Injection Area C-1****,* four rows are planned for ***Injection Area B-1,*** two rows are planned for ***Injection Area B-2***, while a double-row curtain design will be implemented in ***Injection Area A-1***. Curtain areas are generally oriented perpendicular to either the plume or parallel with building walls or sewer transects that control injection accessibility. Anticipated injection locations are presented on **Figure 2**. This configuration was designed to provide the most thorough coverage per ***Injection Area***. After the number of points was established per ***Injection Area***, the total oil demand for each ***Injection Area*** was divided by the number of points.

Based on previous CAP 18 ME^{TM} injection events at the Site performed in August 2007 and February 2009, several design factors have been implemented. This design accounted for injecting the CAP 18 ME^{TM} conservatively throughout a 12-foot thickness in the upper saturated zone at each injection point in ***Injection Area A-1***, and throughout a 20-foot thickness in the upper saturated zone at each injection point in ***Injection Areas B-1, B-2,*** and ***C-1***. These injection thicknesses allow for introduction of the product throughout the sand and gravel aquifer down into the top of the underlying silty clay glacial till, which acts as a barrier to further vertical groundwater movement. In ***Injection Area B-1,*** an additional set of injection locations positioned adjacent to monitoring wells MMW-P-12S and MMW-P-12D have been included in the design to provide added treatment across an approximate five foot vertical thickness, focused on the smear zone and water table in this area.

As an additional enhancement to the injection plan, halo-respiring bacteria will be added to the CAP 18 ME^{TM}. The bacteria will be added to the CAP 18 ME^{TM} material in optimal amounts prior to injection via drilling rods. The addition of the bacteria will serve to more rapidly increase the mass of bacteria acting on the remaining residual chlorinated material.

Introduction of the CAP 18 ME^{TM} into the aquifer at 3-foot depth intervals has proven to be the most effective injection strategy during the previous two injection events. In addition, injection of twice as much product into the upper 10 feet of the saturated zone as compared to greater depths places the product in the zone most impacted by previous releases from the former Accent cleaners. This will focus the remedial effort on the drycleaner impact as opposed to treatment of deeper impacts associated with an upgradient source.

As previously completed during prior injection events, MUNDELL will also monitor groundwater levels in nearby monitoring wells during the injection process to document the temporal effects the CAP 18 ME™ injection rate might have, if any, on vicinity water levels. These wells will include (see **Figure 1** and **Figure 2**):

Source Area A:	MMW-P-02, MMW-P-03S/D, MMW-P-11S/DR, MMW-P-13S/D, and MW-170S/D
Source Area B1:	MMW-P-12S/D, MMW-P-07, and MW-167S/D
Source Area B2:	MMW-8S
Source Area C:	MMW-1S, MMW-9S, MMW-10S, MMW-12S, MMW-14D

Health and Safety

MUNDELL will prepare a Health and Safety Plan to ensure that activities for remediation will be conducted with industry standard safety measures, and that the surrounding public would not be threatened by any of the activities the occurred.

MUNDELL will contact Indiana Plant Protection Service (IUPPS) for utility locates in the specific areas being drilled. As a supplement to this utility locate, MUNDELL will also utilize its own geophysics department to provide more in depth locates of utilities and obstructions. Locations will be adjusted based upon the results of these utility investigations as needed.

CAP 18 ME™ Injection Application

CAP 18 ME™ injection remediation activities are anticipated to begin in April 2013, or after approval from IDEM is received. CAP 18 ME™ will be injected into each injection point using the following protocol:

1) At each injection point in Area A-1, the Geoprobe® will direct push the drill rods approximately 12 feet into the saturated zone. Based on historic gauging data, the terminus depth will be approximately 31-32 ft-bgs.

2) At each injection point of Areas B-1, B-2, and C-1, the Geoprobe® will direct push the drill rods down to the bottom depth, as determined by the depth of the lower clay till layer.

3) The total poundage of CAP 18 ME™ loading designed per boring and a conversion of 7.7 pounds per gallon will be used to estimate the amount of gallons required. From this amount, the estimated amount of 3-foot lifts will be calculated, with the bottom lift being just into the clay till, and the top lift being

anywhere from 1 to 3 feet above the observed water table (to account for seasonal fluctuations).

4) Calculated volumes of CAP 18 ME™ will be pumped from the 55-gallon drums into a hopper, bacteria will be added, and this mix will be pumped utilizing a diaphragm pump and compressor through tubing sealed and connected to the Geoprobe® tooling rods down into the bottom of the drill rods, where it is slowly injected under pressure into the formation at the 3-foot lift intervals and loading requirements established above. At completion, each boring will be filled with granular bentonite and capped with either topsoil if in grassy areas, or asphalt patch in the parking areas.

5) MUNDELL will collect pre-injection and post-injection static water level readings in monitoring wells nearest the injection locations to evaluate the anticipated radius of influence (of 10 feet). The readings will be summarized in a table included in the 2nd Quarter 2013 *Quarterly Monitoring Report* for the Site.

Table 2 is provided which summarizes the planned injection quantities for each injection point, and each ***Injection Area***.

We appreciate the opportunity to update IDEM on the proposed upcoming remedial activities proposed at the Site, and look forward to IDEM's approval. If you have any questions, please do not hesitate to contact us at (317) 630-9060 or via email (jmundell@MundellAssociates.com; mbreting@MundellAssociates.com).

Sincerely,

MUNDELL & ASSOCIATES, INC.

Mark E. Breting

Mark E. Breting, L.P.G.
Senior Project Geologist

John A. Mundell

John A. Mundell, P.E., L.P.G.
President/Senior Environmental Consultant

Attachments: Tables
Figures

cc: Mr. Peter Cappel, AMMH

TABLES

TABLE 1

CAP 18™ and CAP 18 ME™ Anaerobic Bioremediation Products Design Software
Input Parameters and Estimation Methodology

Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

INJECTION AREA A-1

Treatment Area Volume		ESTIMATION METHOD
Curtain Length	50 feet	Based upon remaining chlorinated solvent impacts as indicated by Quarterly monitoring activities.
Thickness of Treatment Zone	12 feet	Saturated interval thickness in Injection Area A-1
Well Spacing	10 feet	An injection spacing of 10 - 15 ft on centers is considered very effective for sandy saturated units, as encountered at the Site during previous soil investigations.
Treatment Area Characteristics		
Nominal Soil Type	SAND	Based upon field conditions observed during previous soil investigations.
Total Porosity	0.38	Default Values
Effective Porosity	0.29	
Hydraulic Conductivity	28.5 ft/d	
Hydraulic Gradient	0.003975 ft/ft	Calculated using the average hydraulic gradient from Quarters 1-4, 2010. The hydraulic gradient was calculated for each Quarter, then averaged across the four Quarters.
CAP-18 Lifespan	2 years	Based upon the estimated CAP 18 ME™ lifetimes observed following the 2007 and 2009 injection events.
Dissolved Contaminant Demand		
PCE	0.214 mg/L	Averaged MMW-P-11S and MMW-P-02 groundwater concentrations from Quarters 1-4 ,2011.
TCE	0 mg/L	
DCE	0.042 mg/L	
VC	0.226 mg/L	
Background Demand		
Oxygen	0.484 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4, 2011 and 2012. (Wells included: MMW-P-05, MMW-P-06, MMW-P-04, MMW-P-03S, MMW-P-03D, MMW-P-11S, MMW-P-02 and MMW C-02)
Nitrate	0.64 mg/L	Averaged groundwater concentrations. (Wells included: MMW-P-06, MMW-P-04, MMW-P-03S, MMW-P-03D MMW-P-11S, and MMW-P-02)
Manganese	2.0 mg/L	Default Value
Iron	2.62 mg/L	Averaged groundwater concentrations. (Wells included: MMW-P-05, MMW-P-06, MMW-P-04, MMW-P-03S, MMW-P-03D,MMW-P-11S and MMW-P-02)
Sulfate	71.99 mg/L	Averaged groundwater concentrations from Quarters 1-4, 2011 and 2012. (Wells included: MMW-P-05, MMW-P-06, MMW-P-04, MMW-P-03S, MMW-P-03D, MMW-P-11S, MMW-P-02 and MMW-C-02)
Hardness	496 mg/L	Averaged groundwater concentrations from Quarters 1-4 ,2010. (Wells included: MMW-P-03S)

TABLE 1

CAP 18™ and CAP 18 ME™ Anaerobic Bioremediation Products Design Software

Input Parameters and Estimation Methodology

Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

INJECTION AREA B-1

Treatment Area Volume		ESTIMATION METHOD
Curtain Length	60 feet	Based upon remaining chlorinated solvent impacts as indicated by Quarterly monitoring activities.
Thickness of Treatment Zone	20 feet	Saturated interval thickness in Injection Area B-1 (three injection locations adjacent to MMW-P12S and MMW-P-12D will have a treatment zone limited to approximately five feet across smear zone/water table)
Well Spacing	10 feet	An injection spacing of 10 - 15 ft on centers is considered very effective for sandy saturated units, as encountered at the Site during previous soil investigations.
Treatment Area Characteristics		
Nominal Soil Type	SAND	Based upon field conditions observed during previous soil investigations.
Total Porosity	0.38	Default Values
Effective Porosity	0.29	
Hydraulic Conductivity	28.5 ft/d	
Hydraulic Gradient	0.003975 ft/ft	Calculated using the average hydraulic gradient from Quarters 1-4, 2010. The hydraulic gradient was calculated for each Quarter, then averaged across the four Quarters.
CAP-18 Lifespan	2 years	Based upon the estimated CAP 18 ME™ lifetimes observed following the 2007 and 2009 injection events.
Dissolved Contaminant Demand		
PCE	0.0476 mg/L	Averaged groundwater concentrations as measured during Quarters 1-4 , 2011. (Wells included: MMW-P-01, MMW-P-12S, MMW-P12D)
TCE	0.0457 mg/L	
DCE	0.850 mg/L	
VC	2.324 mg/L	
Background Demand		
Oxygen	0.225 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 , 2011. (Wells included: MMW-P-12S, MMW-P12D)
Nitrate	0 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 , 2011. (Wells included: MMW-P-12S, MMW-P12D)
Manganese	2.0 mg/L	Default Value
Iron	2.1 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 , 2011. (Wells included: MMW-P-12S, MMW-P12D)
Sulfate	140 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 , 2011. (Wells included: MMW-P-08)
Hardness	688 mg/L	

TABLE 1

CAP 18™ and CAP 18 ME™ Anaerobic Bioremediation Products Design Software
Input Parameters and Estimation Methodology

Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

INJECTION AREA B-2

Treatment Area Volume		ESTIMATION METHOD
Curtain Length	22 feet	Based upon remaining chlorinated solvent impacts as indicated by Quarterly monitoring activities.
Thickness of Treatment Zone	20 feet	Saturated interval thickness in Injection Area B-2
Well Spacing	10 feet	An injection spacing of 10 - 15 ft on centers is considered very effective for sandy saturated units, as encountered at the Site during previous soil investigations.
Treatment Area Characteristics		
Nominal Soil Type	SAND	Based upon field conditions observed during previous soil investigations.
Total Porosity	0.38	Default Values
Effective Porosity	0.29	
Hydraulic Conductivity	28.5 ft/d	
Hydraulic Gradient	0.003975 ft/ft	Calculated using the average hydraulic gradient from Quarters 1-4, 2010. The hydraulic gradient was calculated for each Quarter, then averaged across the four Quarters.
CAP-18 Lifespan	2 years	Based upon the estimated CAP 18 ME™ lifetimes observed following the 2007 and 2009 injection events.
Dissolved Contaminant Demand		
PCE	0.180 mg/L	Averaged groundwater concentrations as measured during Quarters 1-4 , 2011. (Wells included: MMW-8S, MMW-P-08, MMW-P-07, MMW-P-12S, MMW-P12D)
TCE	0.0195 mg/L	
DCE	0.254 mg/L	
VC	0.152 mg/L	
Background Demand		
Oxygen	0.750 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 , 2011. (Wells included: MMW-8S, MMW-P-08, MMW-P-07)
Nitrate	16.3 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 , 2011. (Wells included: MMW-8S, MMW-P-08, MMW-P-07)
Manganese	2.0 mg/L	Default Value
Iron	3.32 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 , 2011. (Wells included: MMW-8S, MMW-P-08, MMW-P-07)
Sulfate	105.7 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 , 2011. (Wells included: MMW-8S, MMW-P-08, MMW-P-07)
Hardness	707.8 mg/L	

TABLE 1

CAP 18™ and CAP 18 ME™ Anaerobic Bioremediation Products Design Software

Input Parameters and Estimation Methodology

Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

INJECTION AREA C-1

Treatment Area Volume		**ESTIMATION METHOD**
Curtain Length	55 feet	Based upon remaining chlorinated solvent impacts as indicated by Quarterly monitoring activities.
Thickness of Treatment Zone	20 feet	Saturated interval thickness in Injection Area C-1
Well Spacing	12 feet	An injection spacing of 10 - 15 ft on centers is considered very effective for sandy saturated units, as encountered at the Site during previous soil investigations.
Treatment Area Characteristics		
Nominal Soil Type	SAND	Based upon field conditions observed during previous soil investigations.
Total Porosity	0.38	Default Values
Effective Porosity	0.29	
Hydraulic Conductivity	28.5 ft/d	
Hydraulic Gradient	0.003975 ft/ft	Calculated using the average hydraulic gradient from Quarters 1-4, 2010. The hydraulic gradient was calculated for each Quarter, then averaged across the four Quarters.
CAP-18 Lifespan	2 years	Based upon the estimated CAP 18 ME™ lifetimes observed following the 2007 and 2009 injection events.
Dissolved Contaminant Demand		
PCE	0.291 mg/L	Averaged MMW-1S groundwater concentrations from Quarters 1-4 ,2011.
TCE	0.028 mg/L	
DCE	0.028 mg/L	
VC	0.021 mg/L	
Background Demand		
Oxygen	0.6 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 ,2011 and 2012. (Wells included: MMW-1S, MMW-8S, MMW-9S, MMW-10S, MMW-11S and MMW-12S)
Nitrate	2.56 mg/L	Averaged groundwater concentrations collected Quarter 1-4, 2011 and 2012. (Wells included: MMW-9S and MMW-11S)
Manganese	2.0 mg/L	Default Value
Iron	3.26 mg/L	Averaged groundwater concentrations from Quarter 1-4, 2011 and 2012. (Wells included: MMW-9S and MMW-10S, MMW-P-03S, MMW-P-08)
Sulfate	133.09 mg/L	Averaged groundwater concentrations from Quarters 1-4 ,2011. (Wells included: MMW-9S, MMW-10S, MMW-P-03S and MMW-P-08)
Hardness	688 mg/L	

TABLE 2 **Proposed CAP 18 ME^{TM} Injection Locations** **Including Anticipated Injection Amounts** **April 2013** Michigan Plaza 3801-3823 West Michigan Street Indianapolis, Indiana MUNDELL Project No. M01046		
INJECTION AREA A-1		
Injection Point Identification	**Planned Injection Mass (lbs)**	**Planned Injection Volume (gallons)**
51	118.29	15.4
52	118.29	15.4
53	118.29	15.4
54	118.29	15.4
55	118.29	15.4
56	118.29	15.4
57	118.29	15.4
58	118.29	15.4
59	118.29	15.4
60	118.29	15.4
61	118.29	15.4
62	118.29	15.4
63	118.29	15.4
64	118.29	15.4
65	118.29	15.4
66	118.29	15.4
67	118.29	15.4
INJECTION AREA A-1: TOTAL INJECTION AMOUNTS	2,011	261.2
INJECTION AREA B-1		
24	360.90	46.9
25	360.90	46.9
26	360.90	46.9
27	360.90	46.9
28	360.90	46.9
29	360.90	46.9
30	360.90	46.9
31	360.90	46.9
32	360.90	46.9
33	360.90	46.9
34	360.90	46.9
35	360.90	46.9
36	360.90	46.9
37	360.90	46.9
38	360.90	46.9
39	360.90	46.9
40	360.90	46.9
41	360.90	46.9
42	108.27	14.1
43	108.27	14.1
44	108.27	14.1
INJECTION AREA B-1: TOTAL INJECTION AMOUNTS	6,821	886

TABLE 2

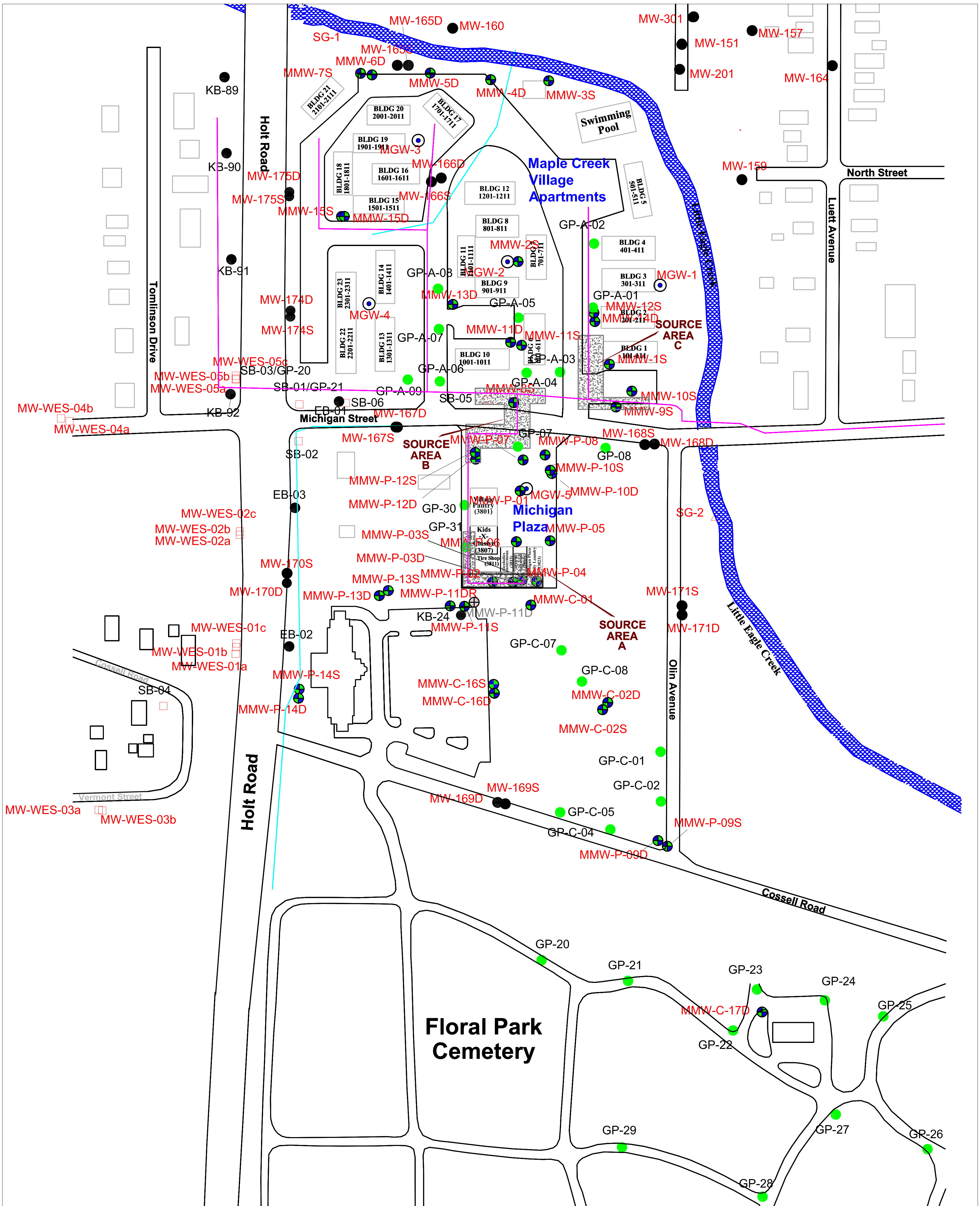
Proposed CAP 18 ME™ Injection Locations Including Anticipated Injection Amounts

April 2013

Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

INJECTION AREA B-2		
45	377.50	49.0
46	377.50	49.0
47	377.50	49.0
48	377.50	49.0
49	377.50	49.0
50	377.50	49.0
INJECTION AREA B-2: TOTAL INJECTION AMOUNTS	2,265	294
INJECTION AREA C-1		
Injection Point Identification	**Planned Injection Mass (lbs)**	**Planned Injection Volume (gallons)**
1	256.61	33.3
2	256.61	33.3
3	256.61	33.3
4	256.61	33.3
5	256.61	33.3
6	256.61	33.3
7	256.61	33.3
8	256.61	33.3
9	256.61	33.3
10	256.61	33.3
11	256.61	33.3
12	256.61	33.3
13	256.61	33.3
14	256.61	33.3
15	256.61	33.3
16	256.61	33.3
17	256.61	33.3
18	256.61	33.3
19	256.61	33.3
20	256.61	33.3
21	256.61	33.3
22	256.61	33.3
23	256.61	33.3
INJECTION AREA C-1: TOTAL INJECTION AMOUNTS	5,902	766.5
SITE-WIDE Injection Totals	**16,999**	**2,208**

FIGURES



LEGEND

	Fence	GP-29	Soil Boring
MMW-P-06	MUNDELL Monitoring Well		Sanitary Sewer
MW-160/ KB-90	ENVIRON Monitoring Well/Soil Boring		Storm Sewer
MW-WES-O1A/ SB-02	U.S. EPA Monitoring Well/Soil Boring		
SG-1	Stream Gauge Location		
MGW-O1	MUNDELL Soil Gas Well		

N

SCALE 0 200 feet

ENVIRON/Keramida Monitoring Well Locations Referenced from Keramida Environmental, Inc. Project No. 2829 March 13, 2002

Mundell Consulting Professionals for the Earth and the Environment

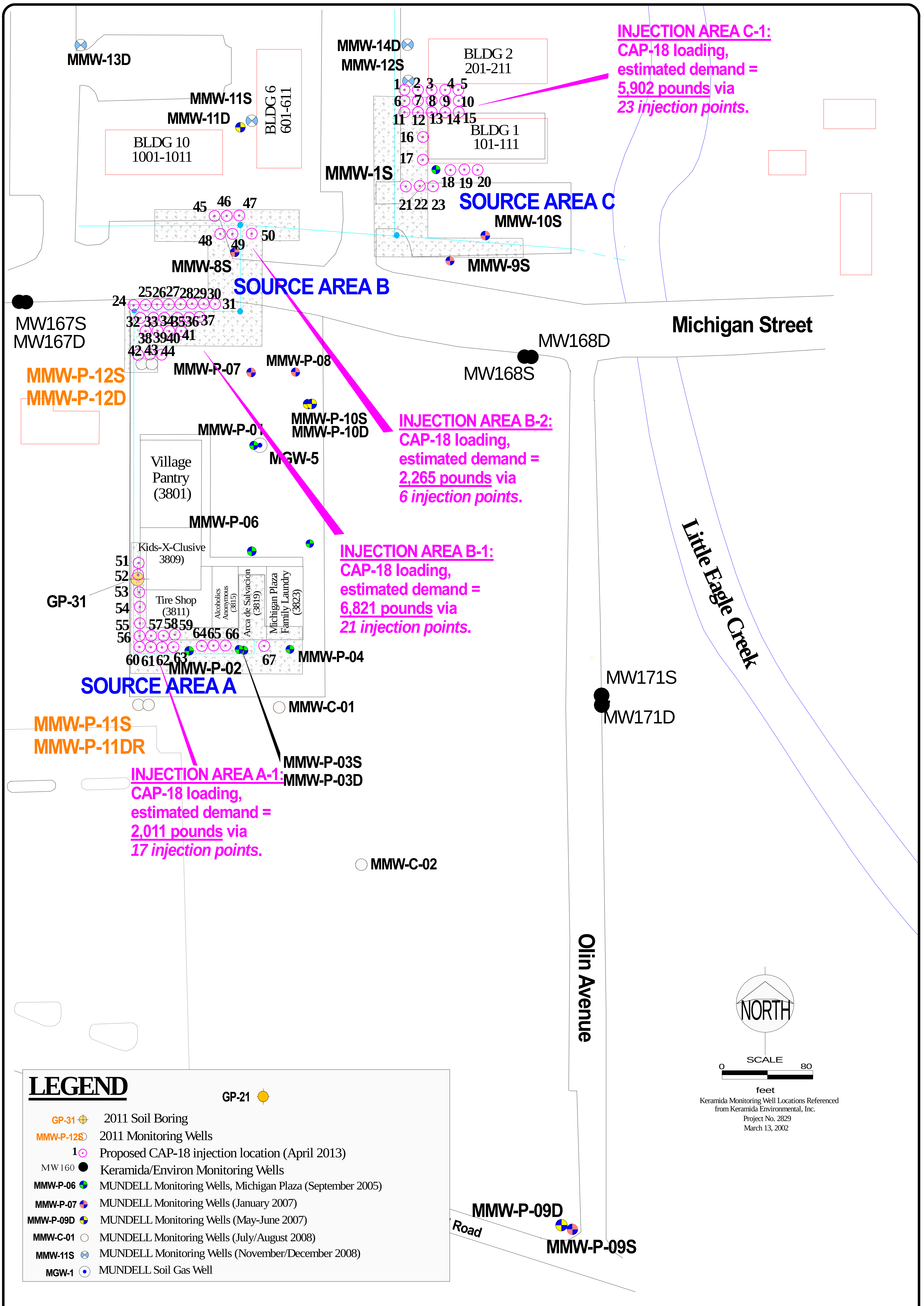
110 South Downey Avenue
Indianapolis, Indiana 46219
317-630-9060, fax 317-630-9065
www.MundellAssociates.com

Project Number: M01046
Drawing File: 3Q12 QMR
Date Prepared: 12-11-12
Scale: 1"=200'

SITE PLAN

Michigan Plaza
3801 - 3823 West Michigan Street
Indianapolis, INDIANA

FIGURE 1



Mundell
Consulting Professionals
for the Earth and the Environment
110 South Downey Avenue
Indianapolis, Indiana 46219-6406
317-630-9060, fax 317-630-9065

Project Number: M01046	
Drawing File: Inj_Pts_Rd3.skf	
Date Prepared: 02/18/2013	
Scale: 1"=80'	

Proposed CAP 18 ME™
Injection Locations
April 2013

Michigan Plaza
3801 - 3823 West Michigan Steet
Indianapolis, Indiana

FIGURE
2

Mundell
Consulting Professionals
for the Earth and the Environment

110 South Downey Avenue
Indianapolis, Indiana 46219-6406
Telephone 317-630-9060
Facsimile 317-630-9065
www.MundellAssociates.com

LETTER OF TRANSMITTAL

TO: Indiana Department of Environmental Management
Voluntary Remediation Program
ATTENTION: Mr. Corey Webb
ADDRESS: ***100 N. Senate Ave., Room 1101***
Indianapolis, Indiana 46204-2251

RECEIVED
APR 30 2013 JFJ
DEPARTMENT OF
ENVIRONMENTAL MANAGEMENT
OFFICE OF LAND QUALITY

DATE: April 30, 2013
PROJECT NO: M1046
RE: Michigan Plaza
FROM Mark Breting and Krissy Vargo

WE ARE SENDING YOU: Attached

No. of copies	Date	Description
2	4/30/13	Response to IDEM's Review of Second Revised Work Plan
1	4/30/13	Response to IDEM's Review of Second Revised Work Plan, Digital

THESE ARE TRANSMITTED: Hand Delivered

MESSAGE:

Mr. Webb,

One (1) digital copy and two (2) hard copies of the latest Response to IDEM's Review of Second Revised Work Plan For the Third Round of CAP 18 ME Injections for the Michigan Plaza Site is attached for your records.

Thank you!
Mark Breting

SIGNED:

110 South Downey Avenue, Indianapolis, Indiana 46219-6406
Telephone 317-630-9060, Facsimile 317-630-9065
www.MundellAssociates.com

April 29, 2013

Mr. Corey Webb
Section Chief
Voluntary Remediation Program
Office of Land Quality
100 North Senate Avenue
Indianapolis, Indiana 46204

Re: ***Response to IDEM's Review of Second Revised Work Plan For the Third Round of CAP 18®ME™ Injections***
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana 46222
IDEM Incident # 0000198
IDEM VRP # 6061202
MUNDELL Project No. M01046

Dear Mr. Webb:

Based on our receipt of the Indiana Department of Environmental Management's March 22, 2013 Review of the Second Revised Work Plan for the Third Round of CAP 18® ME*™* Injections, Mundell & Associates, Inc. (MUNDELL), on behalf of AMMH, is pleased to submit this response as requested. The following paragraphs respond directly to those comments and requests made by IDEM in the above-referenced review letter.

GENERAL COMMENTS

IDEM Comment No. 1:

"A baseline groundwater sampling event must be conducted with results communicated to IDEM prior to beginning injections. The baseline sampling should also include hydrologic testing to confirm the influence of the remedial injections on the formation. The sampling may coincide with one of the regularly scheduled quarterly monitoring events."

MUNDELL Response No. 1:

MUNDELL has completed the baseline groundwater sampling event as part of the 1st Quarter of 2013 monitoring event on February 28 to March 9, 2013. In addition, during March and April 2013, MUNDELL completed hydrologic (falling and rising head slug) testing on seven (7) monitoring wells between the proposed CAP 18® injection locations and the Vermont Street Residents area: MMW-P-02, MMW-P-11S, MMW-P-11DR, MMW-P-13S, MMW-P-13D, MMW-P-14S and MMW-P-14D. The results of the 1st Quarter 2013 monitoring and hydrologic testing are provided as **Attachments 1** and **2**, respectively.

The slug testing results, summarized in **Table 1** with the analysis provided in **Attachment 2**, indicate that the hydraulic conductivity of the upper sand and gravel unit ranged from about 22.1 to 141.1 ft/day, with a representative, mean value of about 70 ft/day. It should be noted that groundwater levels that were displaced temporarily within each monitoring well during the falling and rising head tests were observed to rapidly return to their pre-displacement levels within a few minutes, indicating the responsiveness of the sand and gravel units.

Based upon the measured mean hydraulic conductivity value of 70 ft/day, MUNDELL evaluated the expected behavior of groundwater during a typical 10 hour CAP 18® injection in which the maximum discharge (injection) rate would be limited to about 3 gpm. Note that the actual injection rates for the 2007 and 2009 injection events ranged between 0.38 and 0.70 gpm (See Table 2C). As set forth in **Attachment 2**, our analysis used the pump/injection test software AQTESOLV™ to simulate a constant pumping rate of 3 gpm into a 20 ft thick saturated aquifer with a K value of 70 ft/day, and a storativity (specific yield, S) range of 0.1 to 0.3, and determined that the theoretical maximum response (in this context, water level rise) in the groundwater level at a distance of 1 ft from the injection point is estimated to range between 0.27 and 0.31 ft, with the rise in groundwater level at a distance of 10 ft away from the injection point to be between 0.12 and 0.16 ft. Mounding effects would be negligible (~0.02 ft or less) at a 50-foot distance from the injection point. Therefore, mounding effects even within close proximity to the injection point are expected to be minimal. In addition, once injection stops, the AQTESOLV™ analysis predicts that it will take two hours or less for the groundwater levels to return to approximate pre-injection conditions. This theoretical analysis fully supports the conclusion that no significant mounding of groundwater will occur during the CAP 18® injections.

IDEM Comment No. 2:

"During the injections, the groundwater elevations in nearby wells should be closely monitored to evaluate hydraulic control during remedial implementation. The groundwater elevation monitoring should continue after the injections to assess the physical behavior of the substrate in the formation. The frequency of monitoring both during and after the injections should be based on the results of the hydrologic testing and should be submitted to IDEM for review prior to beginning injections. Once the frequency has been agreed upon the results of groundwater elevations monitoring should be submitted with the quarterly monitoring reports."

MUNDELL Response No. 2:

To determine the frequency of water level and CAP 18® measurements that should be taken and the number and location of wells that should be actively monitored in connection with the proposed 3rd round of injections, MUNDELL reviewed actual monitoring data that were gathered during the injections that took place in August/September of 2007 and February 2009. Had any significant or sustained mounding occurred as a result of the prior CAP 18® injections, water levels in the vicinity of and away from the injections would have been observed to rise several feet above their typical levels and remain there, resulting in a potentiometric surface with contours lines wrapping around the point or area of injection (as if an elevated water level 'hill' is present). This would have resulted in potentiometric contour lines indicating significant radial flow outward from the injection points in all directions.

As a reminder, injection of CAP 18® has been a relatively straight forward process as shown in **MUNDELL Figure 1**. During the previous injection events, a Geoprobe was driven into the A2 aquifer until the upper till surface was encountered. The leading section of the drill rods was a three (3)-foot "screen." A measured quantity of CAP 18® was injected and the drill rods and screen were pulled back (withdrawn) three (3) feet and the injection process was repeated. A typical injection log is presented as **MUNDELL Figure 2** and shows the amount injected at each interval. **MUNDELL Figures 3A thru 3F** are photos of a typical CAP 18® injection and equipment. **MUNDELL Figures 4 and 5** show the injection sites for the August 2007 and February 2009 events, respectively. **Table 2A** presents the specific injection volumes per depth interval for Source Areas A, B and C for the August 1 – September 4, 2007 event (see **MUNDELL Figure 4**). **Table 2B** presents the injection volumes per depth interval for the February 4 – 12, 2009 event (see **MUNDELL Figure 5**). **Table 2C** is a summary of the CAP 18® injection volumes for both events. Again, note that the average injection rate ranged from 0.38 to 0.70 gallons per minute.

During the course of the August 2007 injection, groundwater levels and CAP 18® product levels were monitored. These measurements are presented in **Table 3 – Groundwater Level and CAP 18® Product Level Monitoring – Post Injection**. A water level meter and an oil/water interface probe were used to measure water level changes and observe the presence of any oil on the groundwater surface in the vicinity of the injection locations as the injections were occurring. No measureable groundwater mounding effects or the presence of CAP 18® l (*i.e.*, no rise in groundwater level of more than 0.01 ft or the presence of a measurable CAP 18® thickness of greater than 0.02 ft) beyond a 10 ft radius from the point of injection was observed in nearby monitoring wells associated with **Source Area A** (MMW-P-02, MMW-P-03S/D, MMW-P-04, MMW-P-05, MMW-P-06), **Source Area B** (MMW-P-01, MMW-P07, MMW-P-08, MMW-P-10S/D, MMW-8S) and **Source Area C** (MMW-1S, MMW-8S, MMW-9S, MMW-10S). As observed in the data, the injections caused no widespread or thick layer of CAP 18® to accumulate (as a LNAPL), and there was no change in the potentiometric surface or groundwater flow direction.

As part of its normal quarterly monitoring of the site, MUNDELL measured water levels in on-site monitor wells and prepared a series of potentiometric surface maps for dates prior to and subsequent to both the August 2007 and February 2009 CAP 18® injections. **Figures 6** through **10** cover the period from June 14, 2007 (prior to the August 2007 injection) to June 2, 2008 (ten months after the injection). A review of those figures shows that the direction of groundwater flow through Source Areas A, B and C was generally to the south throughout the ten (10) months subsequent to the injection, with no groundwater mounding. **Figures 11 through 17** cover the period from March 17, 2009 (one-month after the February 2009 injection) to July 20, 2010 (seventeen months after the injection). A review of those figures shows that the direction of groundwater flow through Source Areas A, B and C was generally to the south throughout the seventeen (17) months subsequent to the injection, with no groundwater mounding.

Based on the relative magnitudes of water levels observed during the CAP 18® injections (*i.e.*, the water level did not raise significantly near injection locations as compared to other water levels taken during the injections in wells further away), and the lack of CAP 18® accumulation in wells beyond a distance of 10 ft from the injection points (*e.g.*, note that CAP 18® was detected in MMW-P-04 with a thickness of 3.77" on June 15 (see **Figure 12**) and August 5, 2009 (see **Figure 13**), but not in any other wells), there is no evidence in the field data collected that significant groundwater mounding or CAP 18® transport away from the injection locations occurred as a result of the in-situ bioremediation process.

Based on all previous water level and CAP 18® thickness measurements collected during the 1st and 2nd CAP 18® injections, the recent March-April 2013 hydrologic testing results, and the additional analysis of the expected aquifer response during the CAP 18® injections, and the fact that the proposed injection volume for the 3rd event is less than the injection volume during the first two events, no significant groundwater mounding or CAP 18® movement is expected to occur as a result of the proposed 3rd injection event. In addition, no significant water level rise is expected to occur beyond a distance of about 50 ft away from each active injection location. Finally, once injections are stopped at a particular injection location, any water level rises that occur are expected to return to pre-injection levels within about 2 hours of cessation.

To confirm these predicted outcomes, , as requested by IDEM, MUNDELL will conduct water level and CAP 18® measurements at selected locations in connection with the 3rd CAP 18® injection event. The following wells will be monitored before, during and after the injection:

All Source Areas – MMW-P-02, MMW-P-11S/D, MMW-P-13S/D, MMW-P-14S/D, and MW170S/D (only if accessible by ENVIRON).

Source Areas B and C – MMW-12S/D, MMW-P-01, MMW-P-07

Source Area C – MMW-1S, MMW-9S, MMW-10S

Groundwater level measurements will be made with transducers in the monitoring wells listed above at a frequency of one reading per minute. Water level measurements will also be taken in monitor wells at greater distances with water level indicators at a rate of at least once per hour. Water level measurements will continue to be taken after the injections are completed until it has been determined that either 'no rise' in groundwater level has been observed, or the water level returns to pre-injection conditions. As discussed above, it is expected that readings beyond a few hours after injections should clearly demonstrate that no sustained mounding has occurred. At that time, all monitor wells utilized for water level measurements will be probed with an oil/water interface indicator to determine the presence/absence of any CAP 18®. To provide additional longer-term water level data following the injection event, transducers will be left in MMW-P-11S/D, MMW-P-13S/D, and MMW-P-14S/D to observe long-term water level fluctuations during the quarter following injections. Periodic measurements will be made in these wells with an oil/water interface probe to monitor for the presence/absence of CAP 18®.

IDEM Comment No. 3:

"CAP18 ME creates an anaerobic environment that allows fermentation to occur. Since vapor intrusion is known to occur in the area, IDEM requests that methane be monitored in wells

MMW-P-11, MMNW-P-12, MMW-11S, and MMW-12S during the first quarter after injections to evaluate this concern. After submittal to IDEM, the data will be evaluated to determine if methane monitoring should continue."

MUNDELL Response No. 3:

MUNDELL will complete this task as requested by IDEM. It should be noted that MUNDELL has performed methane testing previously on site on May 10, 2011 and April 24, 2012 in existing permanent gas monitoring wells MGW-01, MGW-02 and MGW-05 to address IDEM concerns regarding potential methane generation during active bioremediation using CAP 18®. As shown in **Figure 18**, all results were less than the method detection limit of 10 parts per million. The location of MGW-05 is directly downgradient of the injections that occurred in Source Area B, the most severely impacted of the three Source Areas.

As methane has not been detected after testing downgradient of Source Area B after the 2007 and 2009 injections events, it is not likely that the 3rd injection event will generate methane concentrations of concern since chlorinated solvent groundwater levels have been dramatically reduced from their pre-injection condition in August 2007. MUNDELL recommends that the methane sampling and testing undertaken be delayed for at least 1 to 2 months after injection so that the sampling and testing will coincide with the most likely time period in which methane production resulting from an increased microbial population is at a maximum.

IDEM Comment No. 4:

"Vinyl chloride (VC) is commonly produced by CAP18 as part of the bioremediation process. Considering that several of the drinking water wells in the Vermont/Cossell neighborhood are contaminated with VC, particular attention should be given to the post injection contaminant trends in MMW-P-12, MMW-P-13, MMW-P-14, and MW-170 well nests. If post injection monitoring shows that the VC in these wells continues to increase appreciably above the baseline sampling results for more than two consecutive quarters, then a contingency plan should be implemented to prevent further degradation of the drinking water supply."

MUNDELL Response No. 4:

MUNDELL will provide a contingency plan in the Remediation Work Plan to account for unexpected events such as the potential increase in VC in MMW-P-11S/D, MMW-P-12, MMW-P-13, MMW-P-14 and MW-170 well nests. It is expected that this plan will include, at a minimum, immediately meeting with IDEM to discuss the observed trends and consideration of additional investigation to identify the cause of the observed trends and increased frequency of sampling and testing of the monitoring wells affected. If an increase in VC in the listed wells is determined to be attributable to the CAP 18® injection, then additional steps may be warranted.

IDEM Comment No. 5:

"The report states that post injection monitoring will continue on a quarterly basis with results "submitted to IDEM at the end of the month following each sampling quarter." This is unnecessarily complex. To date, the analytical results have not been submitted to IDEM on a regular basis. It is important that the sampling results are submitted promptly so potential

concerns can be addressed in a timely manner. Therefore, IDEM requests that the quarterly monitoring results be submitted approximately 60 days after sampling occurs unless a written extension request is submitted and approved."

MUNDELL Response No. 5:

MUNDELL will comply with this request.

IDEM Comment No. 6:

"The final remedial objectives for this remedy were not included in the report, but will be submitted as part of the forthcoming Remediation Work Plan (RWP). IDEM requests that the RWP be submitted within 180 days from the date of this letter. The RWP will need to propose clear, long-term remedial objectives for the project. Also, a contingency plan for potential movement of VC towards the impacted residential neighborhood should be included. As long as drinking water and vapor intrusion receptors remain and it is unlikely that the site will be able to obtain a Covenant Not To Sue without using additional remedial measures to supplement the CAP18 ME injections."

MUNDELL Response No. 6:

MUNDELL will submit the revised RWP within 180 days from the date of IDEM's letter as requested (*e.g.*, by September 22, 2013), and will include both long-term remedial objectives as well as a contingency plan in the event of unexpected impacts towards the Vermont Street residential neighborhood. Following the 3rd round of CAP 18® injections, we will continue to evaluate progress toward the remediation goals set forth in the RWP and determine what additional steps are necessary to achieve satisfactory closure of the Site.

CLOSING

We appreciate the opportunity to provide this information to IDEM and look forward to IDEM's approval of the Work Plan for the 3rd CAP 18 TM® injections. If you should have any questions, please do not hesitate to contact us at (317) 630-9060 or via email (jmundell@MundellAssociates.com; mbreting@MundellAssociates.com).

Sincerely,
MUNDELL & ASSOCIATES, INC.

Mark E. Breting

Mark E. Breting, L.P.G.
Senior Project Geologist

John A. Mundell, P.E., L.P.G.
President/Senior Environmental Consultant

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Attachments: Tables
Figures
Attachment 1 – 1st Quarter 2013 Groundwater Monitoring Results
Attachment 2 – March-April 2013 Hydrologic Testing Results

cc: Mr. Peter Cappel, AMMH
Mr. Scott Reisch, Hogan Lovells US LLP
Mr. Bob, Minning, R.C. Minning & Associates, Inc.

TABLES

Table 1
Slug Test Data Summary - March-April 2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

Field Test Type/ Well I.D.	HYDRAULIC CONDUCTIVITY, ft/day										
	MMW-P-02	MMW-P-11S	MMW-P-11DR	MMW-P-13S	MMW-P-13D	MMW-P-14S	MMW-P-14D	Maximum	Median	Mean	Minimum
Falling Head	33.5	32.9	85.0	57.4	52.0	93.0	67.1	93.0	57.4	60.1	32.9
Rising Head	44.4	38.9	130.3	99.6	22.1	141.1	84.4	141.1	84.4	80.1	22.1
Avg K-Value	**39.0**	**35.9**	**107.6**	**78.5**	**37.0**	**117.0**	**75.8**	**117.0**	**70.9**	**70.1**	**27.5**

Note:

All analyses above utilized the Bower and Rice solution method for unconfined aquifers (Bouwer and Rice, 1976) as contained in the software AQTESOLV™.

Table 2A
CAP18 Injection Data
August 1 - September 4, 2007
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, IN
Mundell Project # M01046

Injection Point	Date of Injection	Depth of Boring (ft)	Depth of Clay till (ft)	Injection Depth Range (ft)	Total Amt CAP18 Injected (gallons)
Source Area A:					
A1	8/16/07	39	39	17-38	22.0
A2	8/16/07	37	37	15-36	22.0
A3	8/16/07	39	NA	17-38	22.0
A4	8/17/07	42	42	17-41	22.0
A5	8/17/07	43	43	15-42	22.0
A6	8/17/07	42	42	17-41	22.0
A7	8/17/07	44	44	16-43	22.0
A8	8/17/07	44	44	16-43	22.0
A9	8/17/07	40	40	15-39	22.0
A10	8/17/07	39	NA	17-38	22.0
A11	8/17/07	43	43	15-42	22.0
A12	8/20/07	52	52	15-51	22.5
A13	8/20/07	34	34	15-33	22.0
A14	8/20/07	36	36	17-35	22.0
A15	8/20/07	36	36	17-35	22.0
A16	8/20/07	36	36	17-35	22.0
A17	8/21/07	39	39	17-38	66.0
A18	8/21/07	36	36	17-35	66.0
A19	8/21/07	36	36	17-35	66.5
A20	8/21/07	39	39	17-38	66.0
A21	8/21/07	36	36	17-35	66.5
A22	8/22/07	38	38	16-37	66.0
A23	8/22/07	39	39	17-38	66.0
A24	8/22/07	37	37	15-36	66.0
A25	8/22/07	36	36	17-35	66.5
A26	8/22/07	36	36	17-35	66.5
A27	8/23/07	36	36	17-35	66.5
A28	8/23/07	35	35	16-34	66.0
A29	8/23/07	36	36	17-35	66.5
A30	8/23/07	35	35	16-34	66.0
A31	8/23/07	35	35	16-34	66.0
A32	8/24/07	32	30	16-31	66.0
A33	8/24/07	34	34	15-33	66.0
A34	8/24/07	32	32	15-31	22.0
A35	8/24/07	34	34	15-33	22.0
A36	8/24/07	34	34	15-33	66.0
A37	8/24/07	32	32	16-31	66.0
A38	8/24/07	32	32	15-31	22.0
A39	9/4/07	36	NA	17-35	55.0
A40	9/4/07	36	NA	17-35	55.0
A41	9/4/07	36	NA	17-35	55.0

Table 2A
CAP18 Injection Data
August 1 - September 4, 2007
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, IN
Mundell Project # M01046

Injection Point	Date of Injection	Depth of Boring (ft)	Depth of Clay till (ft)	Injection Depth Range (ft)	Total Amt CAP18 Injected (gallons)
Source Area B:					
B1	8/1/07	46	38	15-45.5	44.6
B2	8/1/07	42	NA	14.5-41.5	47.2
B3	8/2/07	45	39	14-44	44.2
B4	8/2/07	42	40	14-41	44.4
B5	8/2/07	40	39	15-39	44.0
B6	8/2/07	42	40	17-41	45.0
B7	8/3/07	38	38	16-37	66.5
B8	8/3/07	38	38	16-37	66.5
B9	8/3/07	32	31	17-31	22.0
B10	8/3/07	28	24	15-27	65.0
B11	8/6/07	30	30	17-29	22.0
B12	8/6/07	32	31	16-31	67.0
B13	8/6/07	32	31	16-31	22.0
B14	8/6/07	32	31	16-31	67.0
B15	8/6/07	21	21	16-20	22.0
B16	8/6/07	27	27	17-26	64.0
B17	8/7/07	31	31	15-30	22.0
B18	8/7/07	27	27	17-26	66.0
B19	8/7/07	35	33	15-33	22.0
B20	8/7/07	39	38	17-38	65.5
B21	8/8/07	38	38	16-37	66.3
B22	8/8/07	38	38	16-37	66.3
B23	8/8/07	37	37	15-36	66.3
B24	8/8/07	34	34	15-33	66.0
B25	8/8/07	38	38	15-36	88.5
B26	8/9/07	35	35	16-34	66.0
B27	8/9/07	31	31	15-30	66.0
B28	8/9/07	36	35	17-35	89.0
B29	8/9/07	36	35	16-34	66.0
B30	8/9/07	35	35	16-34	66.0
B31	8/10/07	35	35	16-34	22.5
B32	8/10/07	36	36	17-35	66.0
B33	8/10/07	34	34	15-33	66.0
B34	8/10/07	35	35	16-34	22.0
B35	8/10/07	36	34	17-35	66.0
B36	8/13/07	37	37	15-36	22.0
B37	8/13/07	37	37	15-36	22.0
B38	8/13/07	36	36	17-35	22.0
B39	8/13/07	39	39	17-38	22.0
B40	8/13/07	39	39	17-38	22.0
B41	8/13/07	38	38	16-37	22.0
B42	8/13/07	38	38	16-37	22.0
B43	8/13/07	39	39	17-38	22.0
B44	8/13/07	35	35	16-34	66.0
B45	8/14/07	40	40	15-39	66.0
B46	8/14/07	38	38	16-37	66.5
B47	8/14/07	37	37	15-36	66.5
B48	8/14/07	36	36	17-35	22.0
B49	8/15/07	36	NA	17-35	22.0
B50	8/15/07	34	34	15-33	22.0
B51	8/15/07	35	35	16-34	22.0
B52	8/15/07	37	37	15-36	22.0
B53	8/15/07	36	36	17-35	22.0
B54	8/15/07	35	35	16-34	22.0
B55	8/15/07	36	36	17-35	22.0
B56	8/15/07	40	NA	15-39	58.0

Table 2A
CAP18 Injection Data
August 1 - September 4, 2007
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, IN
Mundell Project # M01046

Injection Point	Date of Injection	Depth of Boring (ft)	Depth of Clay till (ft)	Injection Depth Range (ft)	Total Amt CAP18 Injected (gallons)
B57	8/16/07	37	37	15-36	22.0
B58	8/16/07	36	36	17-35	22.0
B59	8/16/07	37	37	15-36	22.0
B60	8/16/07	35	35	16-34	22.0

Table 2A
CAP18 Injection Data
August 1 - September 4, 2007
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, IN
Mundell Project # M01046

Injection Point	Date of Injection	Depth of Boring (ft)	Depth of Clay till (ft)	Injection Depth Range (ft)	Total Amt CAP18 Injected (gallons)
Source Area C:					
C1	8/27/07	32	32	16-31	66.0
C2	8/27/07	31	31	15-30	66.0
C3	8/27/07	32	32	16-31	66.0
C4	8/27/07	32	NA	16-31	66.0
C5	8/27/07	34	34	15-33	66.0
C6	8/27/07	32	NA	16-31	66.0
C7	8/27/07	34	34	15-33	52.0
C8	8/28/07	34	34	15-33	52.0
C9	8/28/07	36	NA	17-35	52.0
C10	8/28/07	34	NA	15-33	52.0
C11	8/28/07	36	NA	17-35	52.0
C12	8/28/07	35	NA	16-34	52.0
C13	8/28/07	31	NA	15-30	52.0
C14	8/29/07	32	32	16-31	52.0
C15	8/29/07	35	35	16-34	52.0
C16	8/29/07	32	32	16-31	52.0
C17	8/29/07	32	32	16-31	52.0
C18	8/29/07	32	32	16-31	52.0
C19	8/29/07	34	34	15-33	52.0
C20	8/29/07	34	34	15-33	52.0
C21	8/30/07	30	NA	17-29	17.3
C22	8/30/07	32	32	16-31	17.5
C23	8/30/07	31	NA	15-30	17.3
C24	8/30/07	32	NA	16-31	17.5
C25	8/30/07	32	NA	16-31	17.3
C26	8/30/07	34	NA	15-33	52.0
C27	8/30/07	34	NA	15-33	17.5
C28	8/30/07	34	NA	15-33	17.3
C29	8/30/07	30	30	17-29	52.0
C30	8/31/07	35	35	16-34	17.5
C31	8/31/07	36	NA	17-35	17.3
C32	8/31/07	33	NA	17-32	17.5
C33	8/31/07	31	31	15-30	52.0
C34	8/31/07	31	31	15-30	17.3
C35	8/31/07	31	31	15-30	17.5
C36	8/31/07	35	35	16-34	17.3
C37	8/31/07	32	NA	16-31	17.5
C38	8/31/07	31	31	15-30	52.0
C39	8/31/07	NA	NA	NA	17.3
C40	9/4/07	32	NA	16-31	30.0

Table 2B
CAP18 Injection Data
February 4-12, 2009
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, IN
Mundell Project # M01046

Injection Point	Date of Injection	Depth of Boring (ft)	Depth of Clay till (ft)	Injection Depth Range (ft)	Total Amt CAP18 Injected (gallons)
Source Area B:					
B-1	2/9/09	38	38	20-38	65.0
B-2	2/9/09	38	38	20-38	65.0
B3	2/9/09	35	35	20-35	65.0
B-4	2/9/09	38	38	20-38	65.0
B-5	2/9/09	38	38	20-38	65.0
B-6	2/10/09	39	39	20-38	65.0
B-7	2/10/09	38	38	20-38	65.0
B-8	2/9/09	38	38	20-38	65.0
B-9	2/10/09	38	38	20-38	65.0
Source Area C:					
C-1	2/11/09	40	40	22-40	65.0
C-2	2/11/09	36	36	15-36	65.0
C-3	2/11/09	36	36	15-36	64.0
C-4	2/11/09	36	36	15-36	65.0
C-5	2/11/09	36	36	15-36	65.0
C-6	2/12/09	36	36	15-36	65.0
C-7	2/12/09	36	36	15-36	65.0
C-8	2/12/09	36	36	15-36	65.0
C-9	2/12/09	36	36	15-36	65.0
C-10	2/12/09	36	36	15-36	65.0
C-11	2/12/09	36	36	15-36	65.0
C-12	2/12/09	36	36	15-36	65.0
C-13	2/12/09	36	36	15-36	65.0
Soil Borings:					
SB-1	2/4/09	32	32	20-32	64.0
SB-2	2/4/09	32	32	20-32	64.0
SB-3	2/5/09	32	32	20-32	67.0
SB-4	2/5/09	32	32	20-32	67.0
SB-5	2/5/09	32	32	20-32	65.0
SB-6	2/5/09	32	32	20-32	65.0
SB-7	2/5/09	32	32	20-32	65.0

TABLE 2C.
SUMMARY OF TOTAL CAP18™ INJECTION VOLUME
FOR 2007 and 2009 EVENTS
Michigan Plaza, Indianapolis, Indiana

2007 TOTAL Injection Quantity = 6,506 gallons

- ***Source Area A**:* 1,962 gallons CAP 18™ over 8 days of field time.
  - ~ 245 gallons per day.
- ***Source Area B**:* 2,815 gallons CAP 18™ over 12 days of field time.
  - ~ 235 gallons per day.
- ***Source Area C**:* 1,729 gallons CAP 18™ over 5 days of field time.
  - ~ 346 gallons per day.

2009 TOTAL Injection Quantity = 1,884 gallons

- ***Source Area A**:* 455 gallons CAP 18 ME™ over 2 days of field time.
  - ~ 228 gallons per day.
- ***Source Area B**:* 585 gallons CAP 18 ME™ over 2 days of field time.
  - ~ 293 gallons per day.
- ***Source Area C**:* 844 gallons CAP 18 ME™ over 2 days field time.
  - ~ 422 gallons per day.

Average Injection Rate Range = 0.38 to 0.70 gallons per minute (gpm)*****

*Based on a 10-hour workdays on each of the injections days; this represents an average rate of more than one order of magnitude less than a small, low-flowing garden hose (3/4 in diameter), which is typically rated at about 10 gpm.

Table 3

Groundwater Level and CAP18 Product Level Monitoring - Post Injection

Michigan Plaza

3801-3823 West Michigan Street

Indianapolis, Indiana

MUNDELL Project No. M01046

Monitoring Well	Top of Casing Elevation (feet MSL)	Total Depth (feet)	Date of Reading	Depth To Water (feet)	Date of Reading	Depth To Water (feet)	Date of Reading	Depth To CAP18 (feet)	Depth To Water (feet)	Date of Reading	Depth To CAP18 (feet)	Depth To Water (feet)	Date of Reading	Depth To CAP18 (feet)	Depth To Water (feet)
On-Site Monitoring Wells (Plaza)															
MMW-P-01	715.79	28	6/14/2007	18.95	--	--	--	--	--	--	--	--	--	--	--
MMW-P-02	716.70	30	6/14/2007	19.96	--	--	--	--	--	--	--	--	8/23/07	20.44	20.45
MMW-P-03S	716.55	28	6/14/2007	19.79	--	--	--	--	--	--	--	--	8/23/07	20.25	20.26
MMW-P-03D	716.45	35	6/14/2007	19.70	--	--	--	--	--	--	--	--	8/23/07	NP	20.15
MMW-P-04	716.27	28	6/14/2007	19.51	--	--	--	--	--	--	--	--	8/23/07	19.91	19.92
MMW-P-05	716.12	28	6/14/2007	19.31	--	--	--	--	--	--	--	--	8/23/07	NP	19.67
MMW-P-06	716.50	28	6/14/2007	19.70	--	--	--	--	--	--	--	--	8/23/07	NP	20.10
MMW-P-07	715.30	28	6/14/2007	18.20	7/30/2007	18.63	8/7/07	NP	18.66	8/16/07	NP	18.84	8/23/07	18.38	18.39
MMW-P-08	715.22	28	6/14/2007	18.09	7/30/2007	18.48	8/7/07	NP	18.50	8/16/07	NP	18.69	8/23/07	18.22	18.23
MMW-P-10S	714.59	28	6/15/2007	17.70	7/30/2007	18.09	8/7/07	NP	18.12	8/16/07	NP	18.30	8/23/07	NP	17.82
MMW-P-10D	714.98	38	6/16/2007	18.09	--	--	--	--	--	--	--	--	8/23/07	NP	18.23
Off-Site Monitoring Wells (Michigan Meadows Apartments)															
MMW-1S	713.66	20	6/14/2007	15.97	--	--	--	--	--	--	--	--	--	--	--
MMW-8S	714.75	24	6/14/2007	16.94	--	--	8/7/07	NP	17.23	8/16/07	NP	17.42	8/23/07	NP	16.94
MMW-9S	714.09	25	6/14/2007	17.01	--	--	--	--	--	--	--	--	--	--	--
MMW-10S	713.23	25	6/14/2007	15.87	--	--	--	--	--	--	--	--	--	--	--

Notes:
NP = No Product observed in well
Shading indicates pre-injection depths to water.

Table 3
Groundwater Level and CAP18 Product Level Monitoring - Post Injection
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

Monitoring Well	Top of Casing Elevation (feet MSL)	Total Depth (feet)	Date of Reading	Depth To CAP18 (feet)	Depth To Water (feet)	Date of Reading	Depth To CAP18 (feet)	Depth To Water (feet)	Date of Reading	Depth To CAP18 (feet)	Depth To Water (feet)
On-Site Monitoring Wells (Plaza)											
MMW-P-01	715.79	28	8/28/07	NP	19.33	8/29/07	19.38	19.39	8/30/07	NP	19.42
MMW-P-02	716.70	30	8/28/07	NP	20.58	8/29/07	20.59	20.60	8/30/07	NP	20.63
MMW-P-03S	716.55	28	8/28/07	NP	20.27	8/29/07	20.30	20.31	8/30/07	NP	20.36
MMW-P-03D	716.45	35	8/28/07	NP	20.37	8/29/07	NP	20.41	8/30/07	NP	20.45
MMW-P-04	716.27	28	8/28/07	NP	20.07	8/29/07	20.10	20.11	8/30/07	20.14	20.15
MMW-P-05	716.12	28	8/28/07	NP	19.78	8/29/07	NP	19.82	8/30/07	19.88	19.89
MMW-P-06	716.50	28	8/28/07	NP	20.21	8/29/07	NP	20.25	8/30/07	20.30	20.31
MMW-P-07	715.30	28	8/28/07	NP	18.49	8/29/07	NP	18.54	8/30/07	NP	18.59
MMW-P-08	715.22	28	8/28/07	NP	18.34	8/29/07	NP	18.38	8/30/07	NP	18.43
MMW-P-10S	714.59	28	8/28/07	NP	17.74	8/29/07	NP	18.40	8/30/07	NP	18.45
MMW-P-10D	714.98	38	8/28/07	NP	18.34	8/29/07	NP	18.00	8/30/07	NP	18.04
Off-Site Monitoring Wells (Michigan Meadows Apartments)											
MMW-1S	713.66	20	8/28/07	NP	15.99	8/29/07	16.03	16.04	8/30/07	16.09	16.10
MMW-8S	714.75	24	8/28/07	NP	17.02	8/29/07	NP	17.09	8/30/07	NP	17.13
MMW-9S	714.09	25	8/28/07	NP	17.14	8/29/07	NP	17.16	8/30/07	NP	17.24
MMW-10S	713.23	25	8/28/07	NP	15.85	8/29/07	15.90	15.91	8/30/07	NP	15.96

Notes:
NP = No Product observed in well

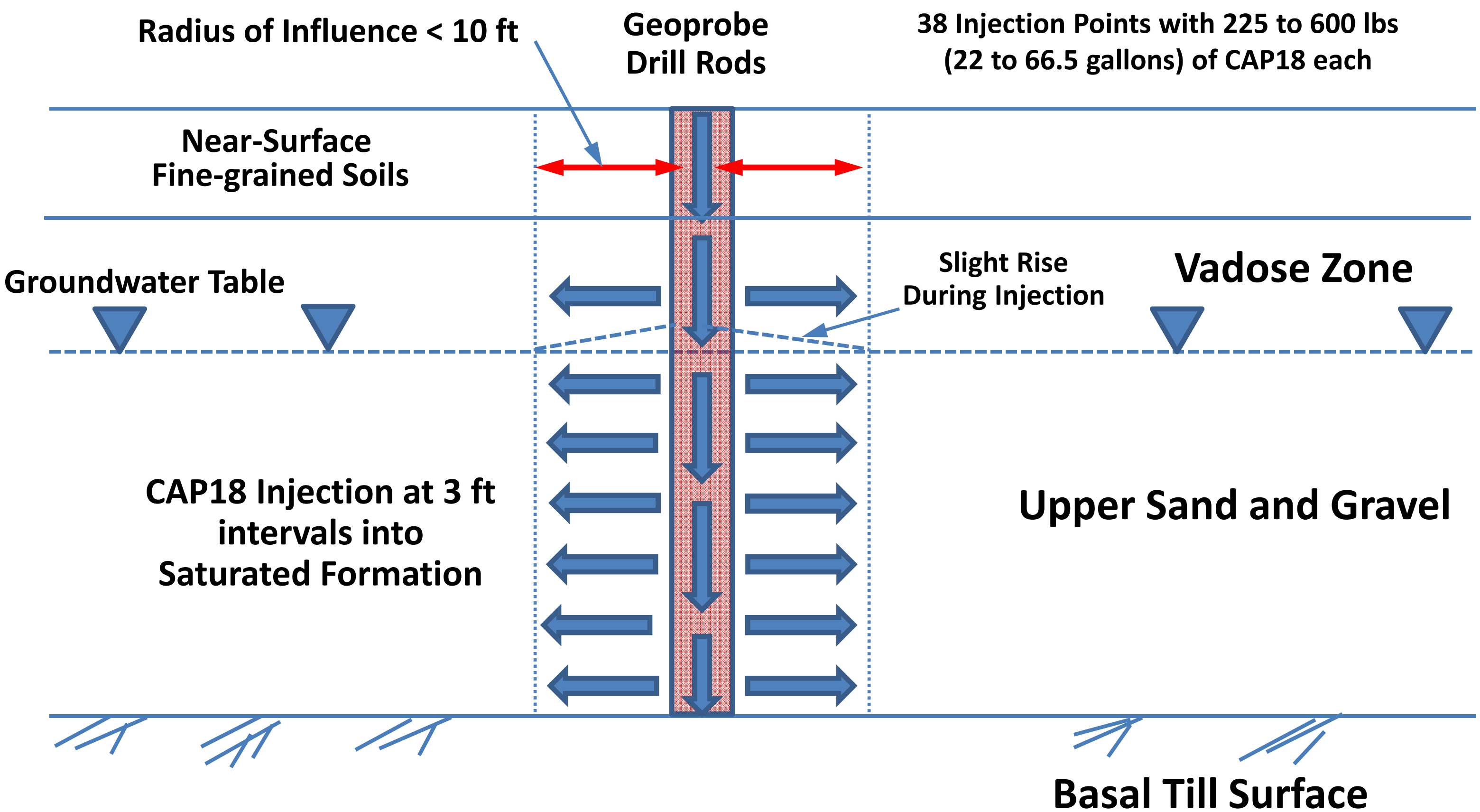
Table 3
Groundwater Level and CAP18 Product Level Monitoring - Post Injection
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

Monitoring Well	Top of Casing Elevation (feet MSL)	Total Depth (feet)	Date of Reading	Depth To CAP18 (feet)	Depth To Water (feet)	Date of Reading	Depth To CAP18 (feet)	Depth To Water (feet)	Date of Reading	Depth To CAP18 (feet)	Depth To Water (feet)
On-Site Monitoring Wells (Plaza)											
MMW-P-01	715.79	28	8/31/07	NP	19.45	9/4/07	NP	19.55	--	--	--
MMW-P-02	716.70	30	8/31/07	20.66	20.67	9/4/07	NP	20.76	--	--	
MMW-P-03S	716.55	28	8/31/07	NP	20.46	9/4/07	NP	20.58	10/25/07	20.56	20.58
MMW-P-03D	716.45	35	8/31/07	NP	20.48	9/4/07	NP	20.57	10/25/07	NP	20.46
MMW-P-04	716.27	28	8/31/07	NP	20.16	9/4/07	NP	20.27	10/25/07	19.98	19.99
MMW-P-05	716.12	28	8/31/07	NP	19.90	9/4/07	NP	20.01	--		
MMW-P-06	716.50	28	8/31/07	NP	20.33	9/4/07	NP	20.42	10/25/07	20.39	20.40
MMW-P-07	715.30	28	8/31/07	NP	18.61	9/4/07	NP	18.71	10/25/07	18.61	18.62
MMW-P-08	715.22	28	8/31/07	NP	18.46	9/4/07	NP	18.56	10/25/07	18.89	18.90
MMW-P-10S	714.59	28	8/31/07	NP	18.46	9/4/07	NP	18.17	--		
MMW-P-10D	714.98	38	8/31/07	NP	18.06	9/4/07	NP	18.58	--		
Off-Site Monitoring Wells (Michigan Meadows Apartments)											
MMW-1S	713.66	20	8/31/07	NP	16.14	9/4/07	NP	16.25	10/25/07	16.03	16.04
MMW-8S	714.75	24	8/31/07	NP	17.19	9/4/07	NP	17.29	--		
MMW-9S	714.09	25	8/31/07	NP	17.24	9/4/07	17.35	17.36	10/25/07	17.17	17.18
MMW-10S	713.23	25	8/31/07	NP	16.00	9/4/07	NP	16.09	--		

Notes:
NP = No Product observed in well

FIGURES

Figure 1 - Typical Cross-Section CAP18TM Injection
Chemical Source Area A
August 2007



MUNDELL & ASSOCIATES, INC.
FIELD BORING LOG

Injection NO: _B-1_

CLIENT: AIMCO	**DATE BEGAN: 2/9/2009 (10:00AM)**
PROJECT LOCATION: Indianapolis, Indiana	**DATE FINISHED: 2/9/2009 (10:33 AM)**
PROJECT NAME: Michigan Meadows Apartments	**DRILLING MEATHOD: Direct Push**
PROJECT NO: M01046	**DRILL EQUIP: Geoprobe**
DRILLING CONTRACTOR: Midway Services, Inc.	**GW Depth (OBSERVED):**
DRILLER: Mark Hicks	**DEPTH OF BORING: 38ft.**
BORING LOCATION: Source Area B (Parking Lot of Michigan Plaza)	**SURFACE ELEVATION: N/A**
FIELD SCIENTIST: LL/AD/	**TOP OF CASING ELEVATION: N/A**

GEOLOGIC DESCRIPTION	*STRATUM DEPTH, ft*	*DEPTH FT*	*GALLONS INJECTED PER INTERVAL*	*COMMENTS*
Ground surface is Asphalt.		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
		12		
		13		
		14		
		15		
		16		
		17		
		18		
		19		
		20	11	
		21		
		22		
		23	11	
		24		
		25		
		26	11	
		27		
		28		
		29	11	
		30		
		31		
		32	11	
		33		
		34		
		35	5	
		36		
		37		
		38	5	Total 65 Gallons
		39		
		40		
		41		
		42		
		43		
		44		
		45		
		46		
		47		
		48		
		49		
		50		

Water Level Observations:	**Sampling Methods:**	**Notes:**
Noted on Rods: _________'	LBS - Large Bore Sampler	TPV - Total Photoionizable Vapors
At Completion:	MBS - Macro Bore Sampler	ND - Not Detected
	HSA - Hollow Stem Auger	* - Water Sample(s) Retained for Laboratory Analysis
	GEO - Geoprobe	Page _1_ of ____.

Fig 14 - CAP-18 Injection Log B-1

Figure 3A – Photo of CAP-18 Injection Process
August 2007

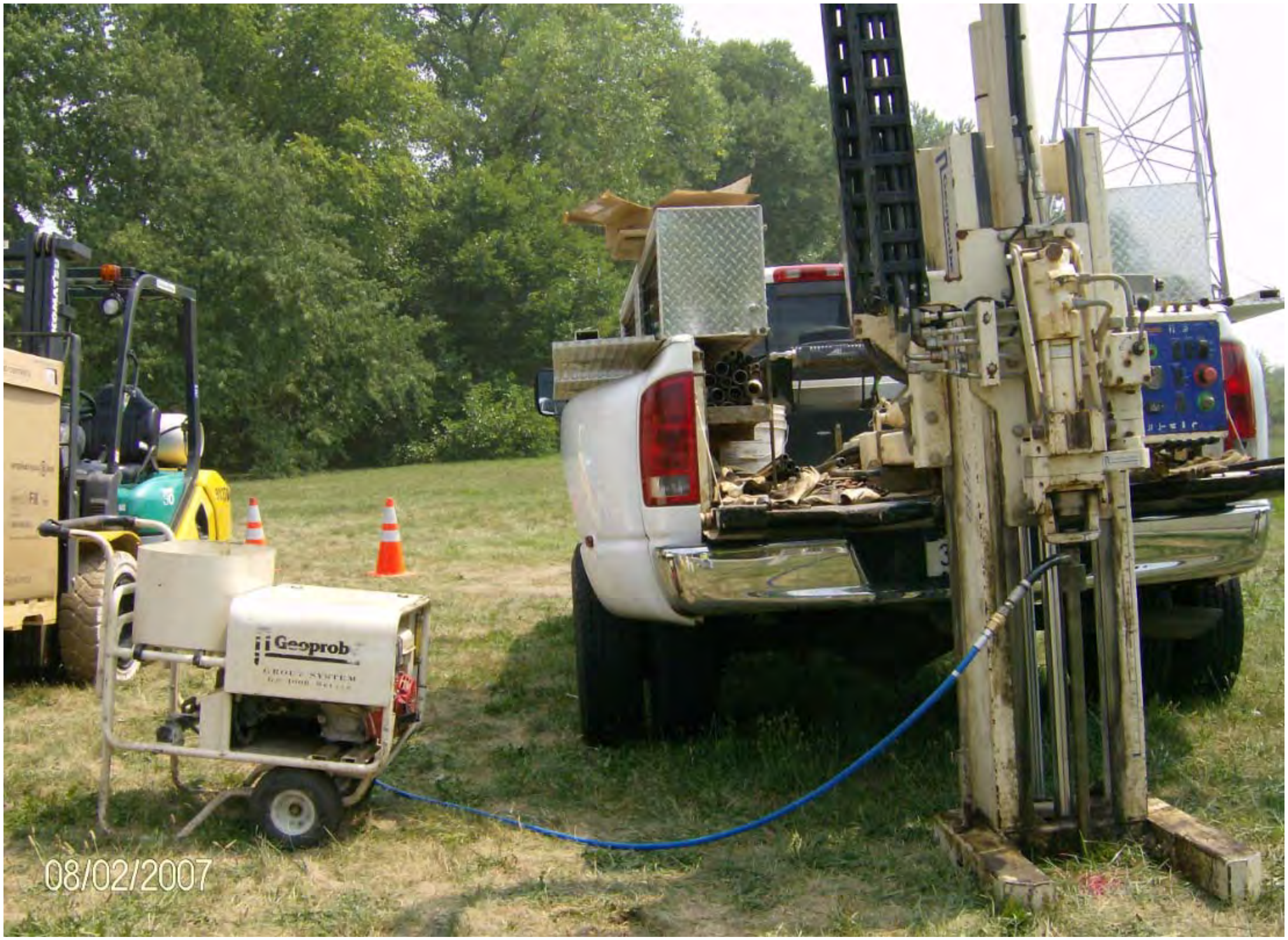
Figure 3B – Photo of CAP-18 Injection Process
August 2007

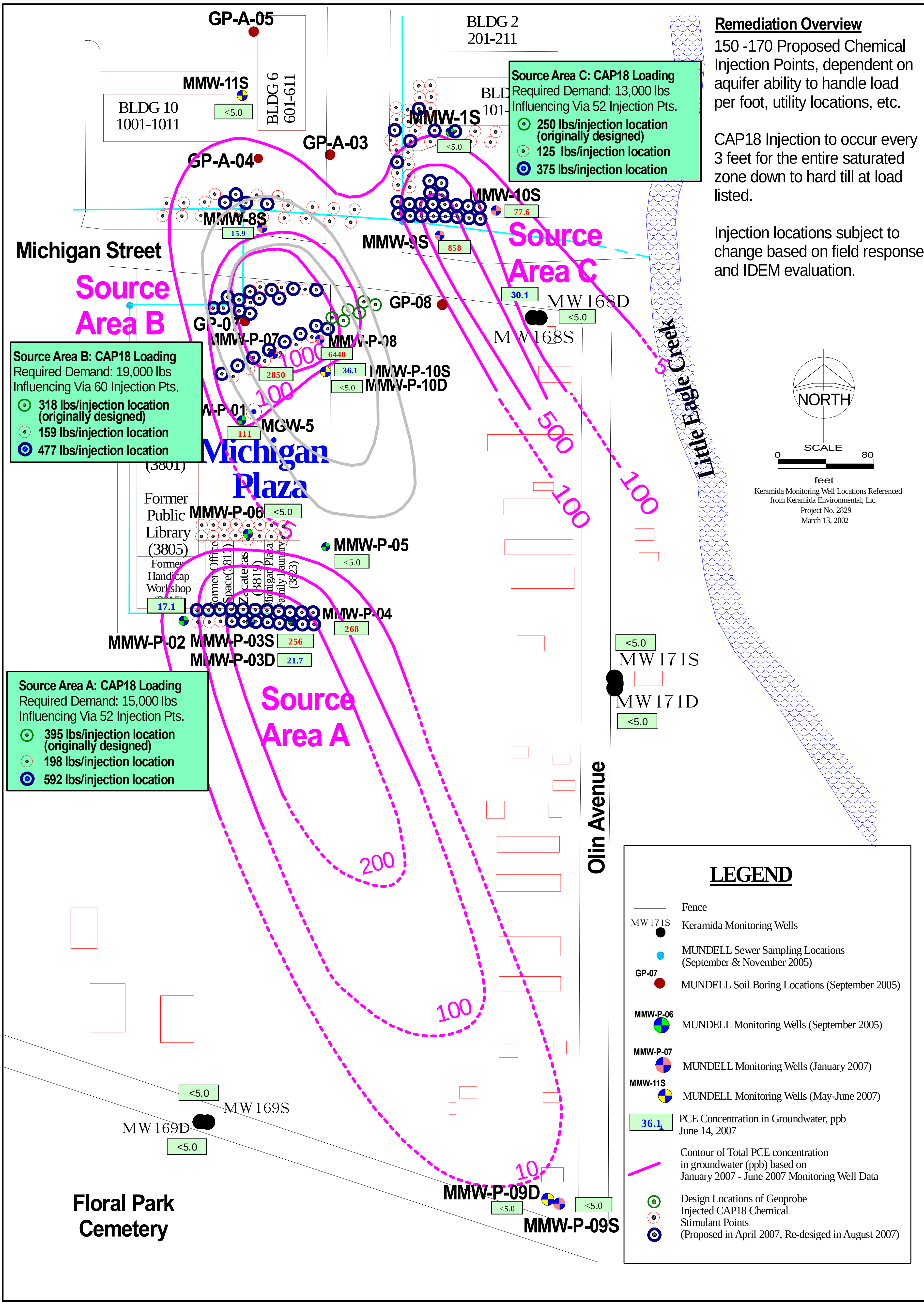
Figure 3C – Photo of CAP-18 Injection Process
August 2007

Figure 3D – Photo of CAP-18 Injection Process
August 2007

Figure 3E – Photo of CAP-18 Injection Process
August 2007

Figure 3F – Photo of CAP-18 Injection Process
August 2007



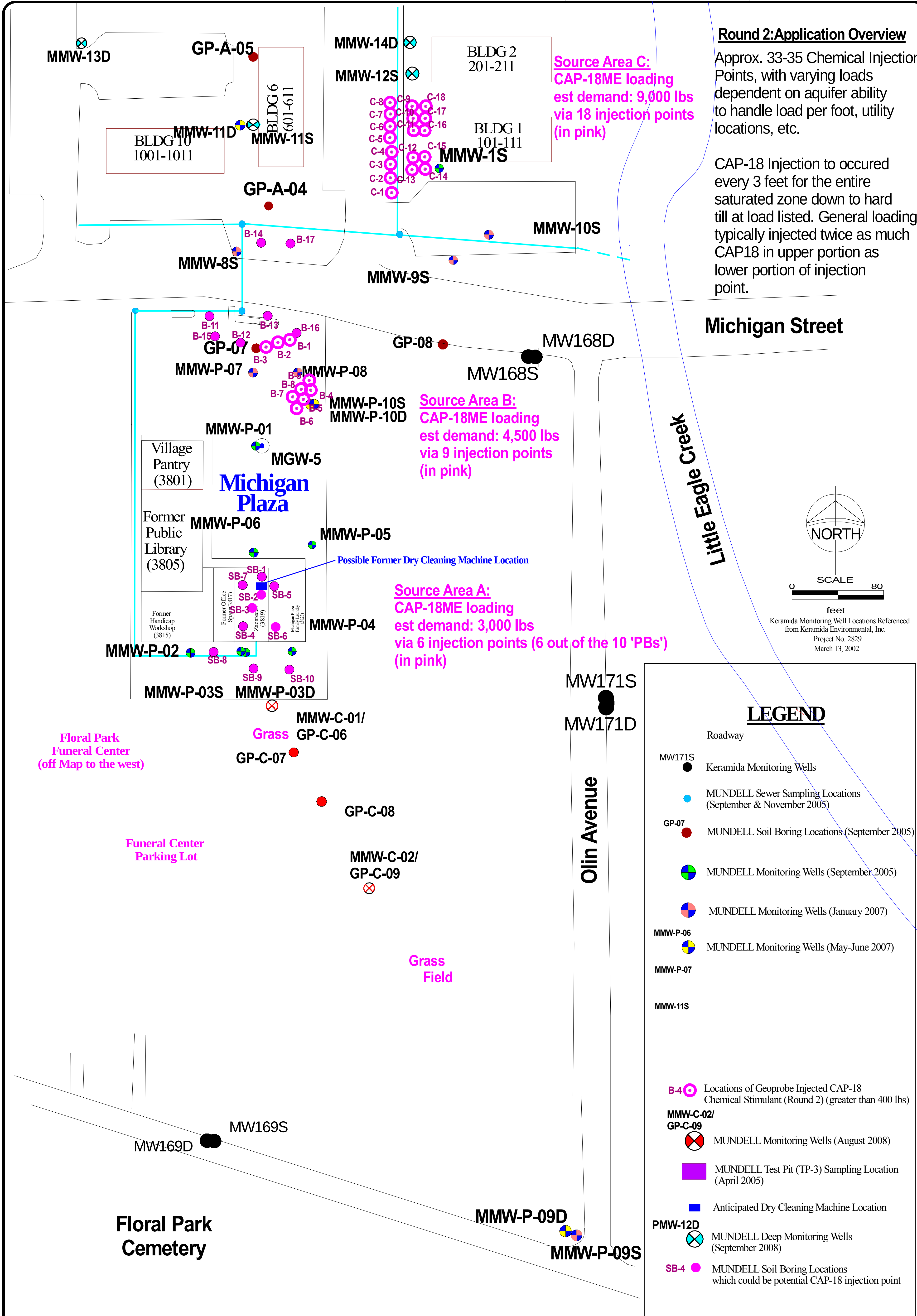


MUNDELL & ASSOCIATES, INC.
Consulting Professionals for the Earth & Environment
429 East Vermont Street, Suite 200
Indianapolis, Indiana 46202-3688
317-630-9060, fax 317-630-9065

Project Number: M01046
Drawing File: Remediation Opt 3
Date Prepared: 8/2/07
Scale: 1"=80' ±

AUGUST - 07 REMEDIAL DESIGN
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana

FIGURE 4



MUNDELL & ASSOCIATES, INC.

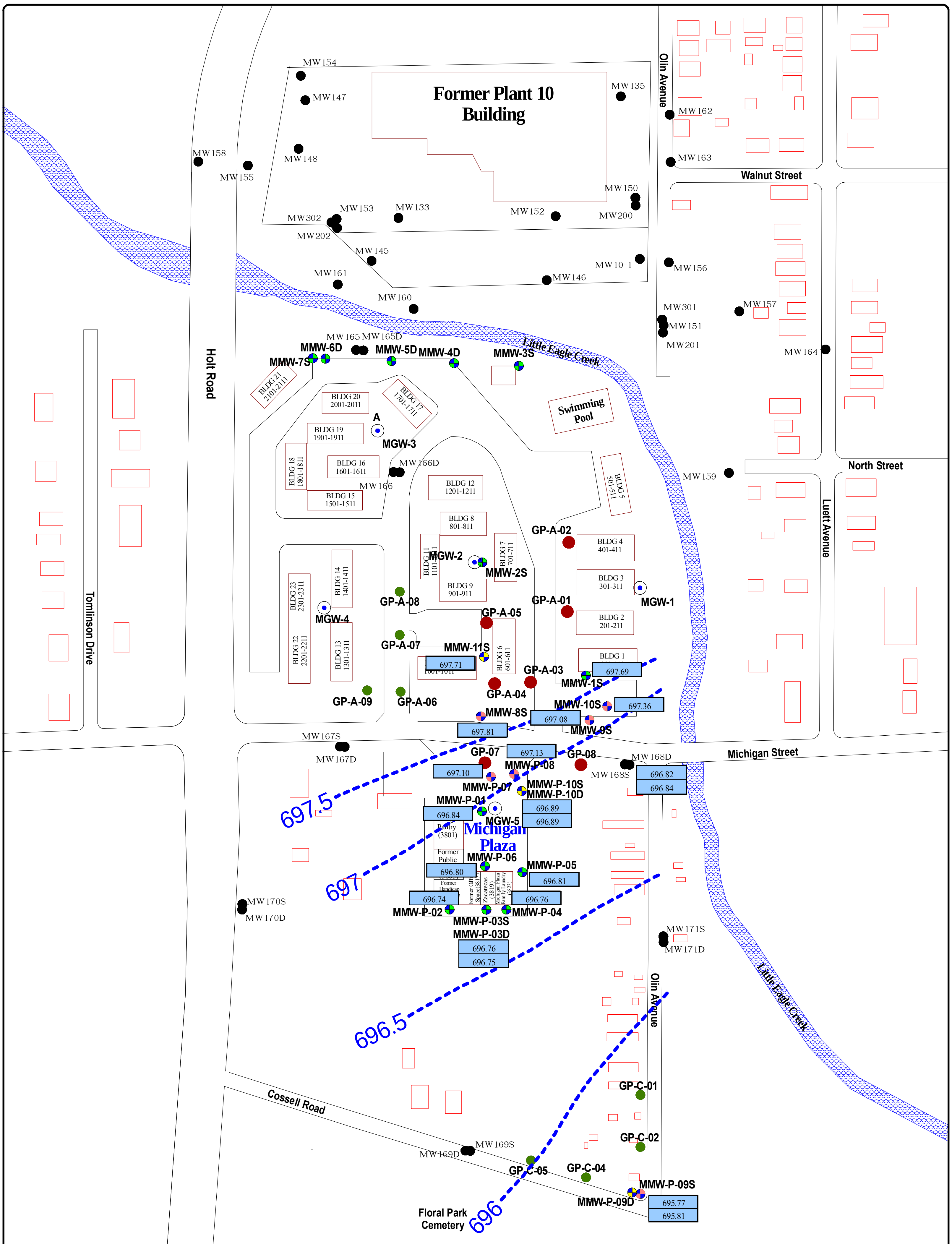
Consulting Professionals for the Earth & Environment

110 South Downey Avenue
Indianapolis, Indiana 46219
317-630-9060, fax 317-630-9065

Project Number: M01046	
Drawing File:	
Date Prepared: 7/17/09	
Scale: 1"=80'	

CAP18 INJECTION REMEDIATION
(Round 2 - February 2009)
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana

FIGURE
5



LEGEND

Fence

MW 160 — Keramida Monitoring Wells

MMW-11S — MUNDELL Monitoring Wells (May-June 2007)

SS-P-01 — MUNDELL Sewer Sampling Locations (September & November 2005)

GP-07 — MUNDELL Soil Boring Locations (September 2005)

MMW-P-06 — MUNDELL Monitoring Wells, Michigan Plaza (September 2005)

GP-C-04 — MUNDELL Soil Boring Locations (January 2007)

696.80 — Water Level as Measured on June 14, 2007

MMW-P-07 — MUNDELL Monitoring Wells (January 2007)

697 — Potentiometric Surface Equal Potential Lines

NORTH

SCALE 0 200 feet

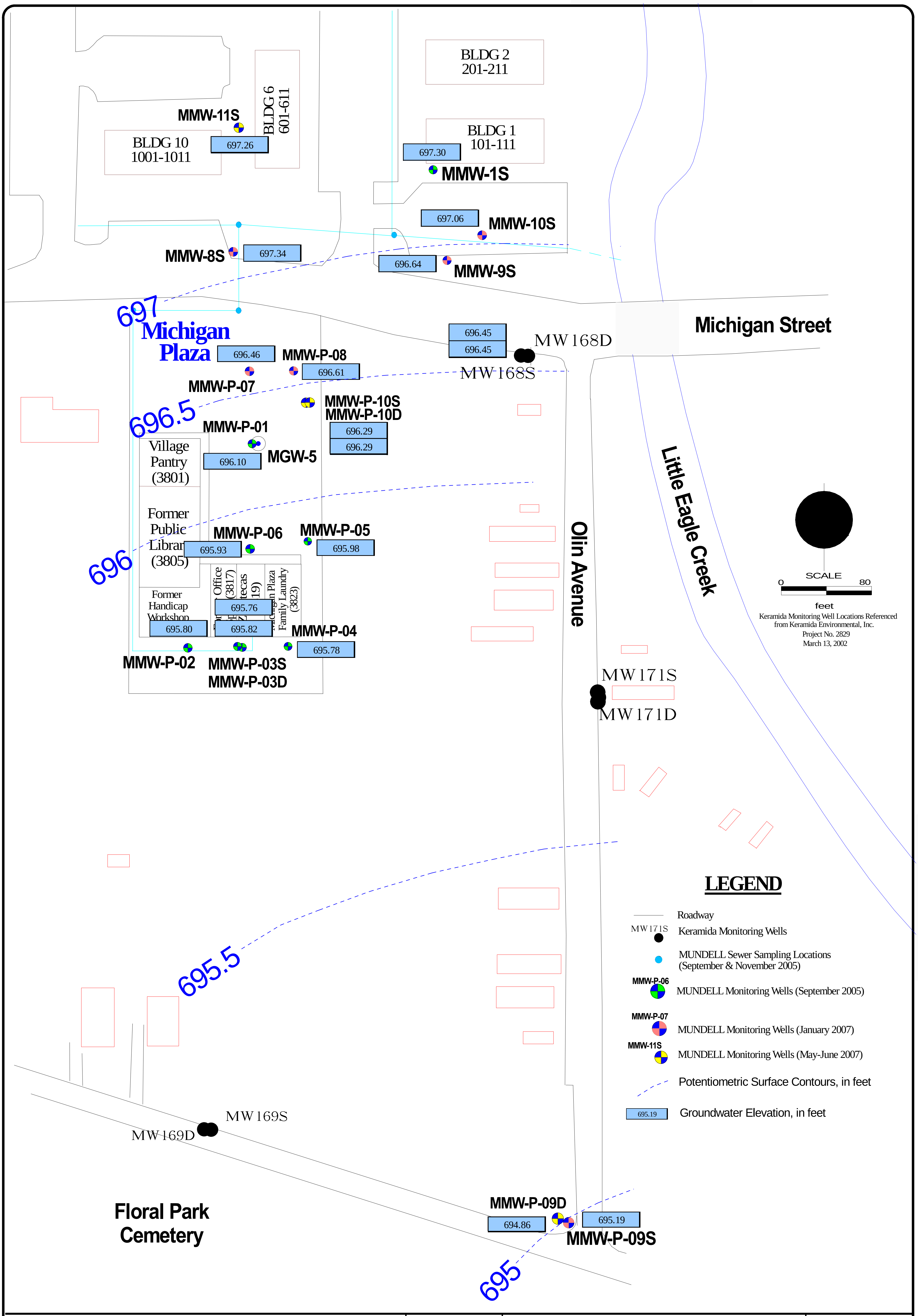
Keramida Monitoring Well Locations Referenced from Keramida Environmental, Inc.
Project No. 2829
March 13, 2002

MUNDELL & ASSOCIATES, INC.
Consulting Professionals for the Earth & Environment
429 East Vermont Street, Suite 200
Indianapolis, Indiana 46202-3688
317-630-9060, fax 317-630-9065

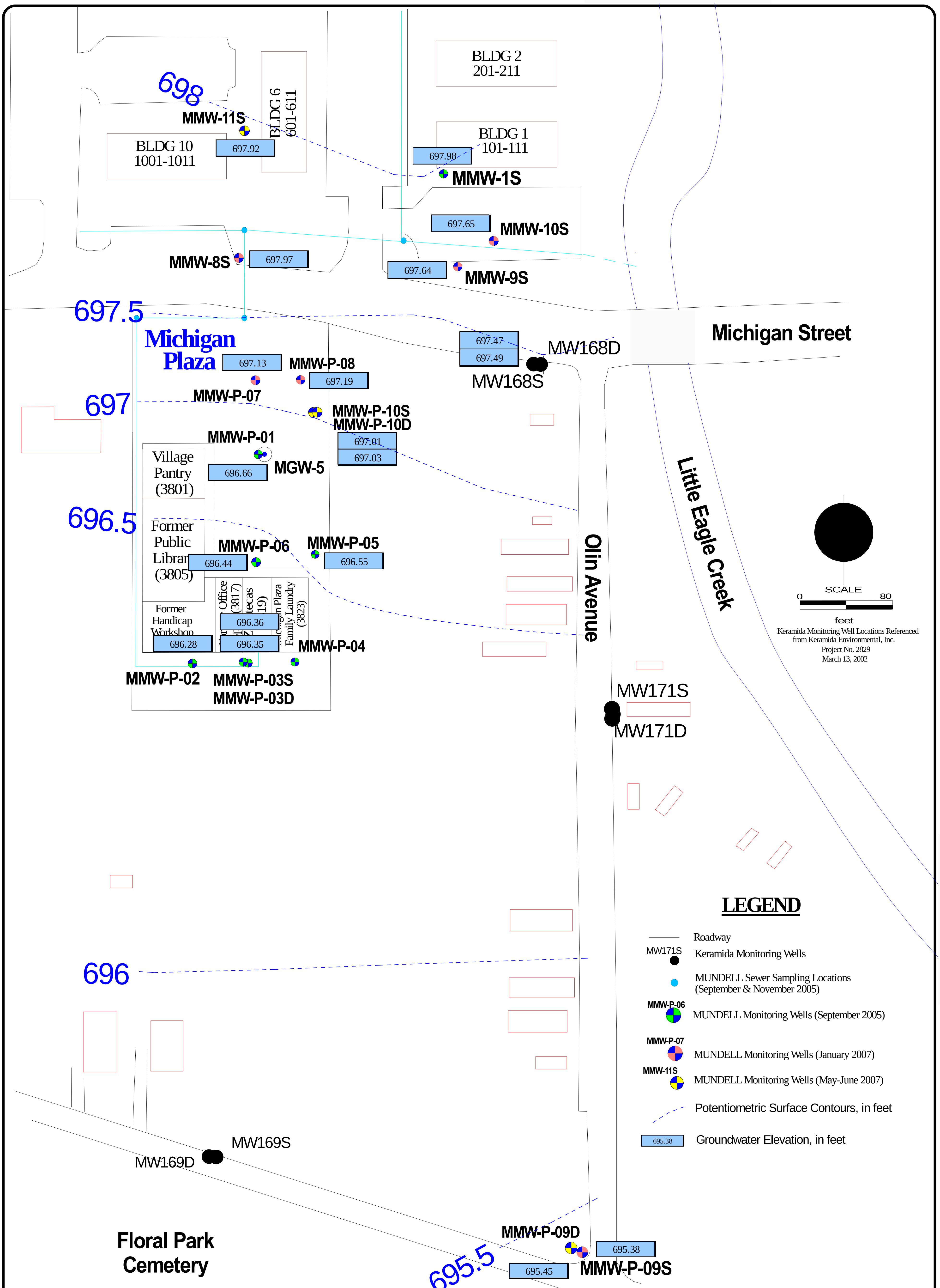
Project Number: M01046
Drawing File: Base Map.SKF
Date Prepared: 7/3/07
Scale: 1"=200' ±

Potentiometric Surface Map
June 14, 2007
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana

FIGURE 6



MUNDELL & ASSOCIATES, INC.	Project Number: M01046	POTENTIOMETRIC SURFACE MAP	FIGURE
Consulting Professionals for the Earth & Environment	Drawing File: Basemap_rev2	**September 19, 2007**	**7**
429 East Vermont Street, Suite 200	Date Prepared: 11/6/07	Michigan Plaza	
Indianapolis, Indiana 46202-3688	Scale: 1"=80'±	3801-3823 West Michigan Street	
317-630-9060, fax 317-630-9065		Indianapolis, Indiana	



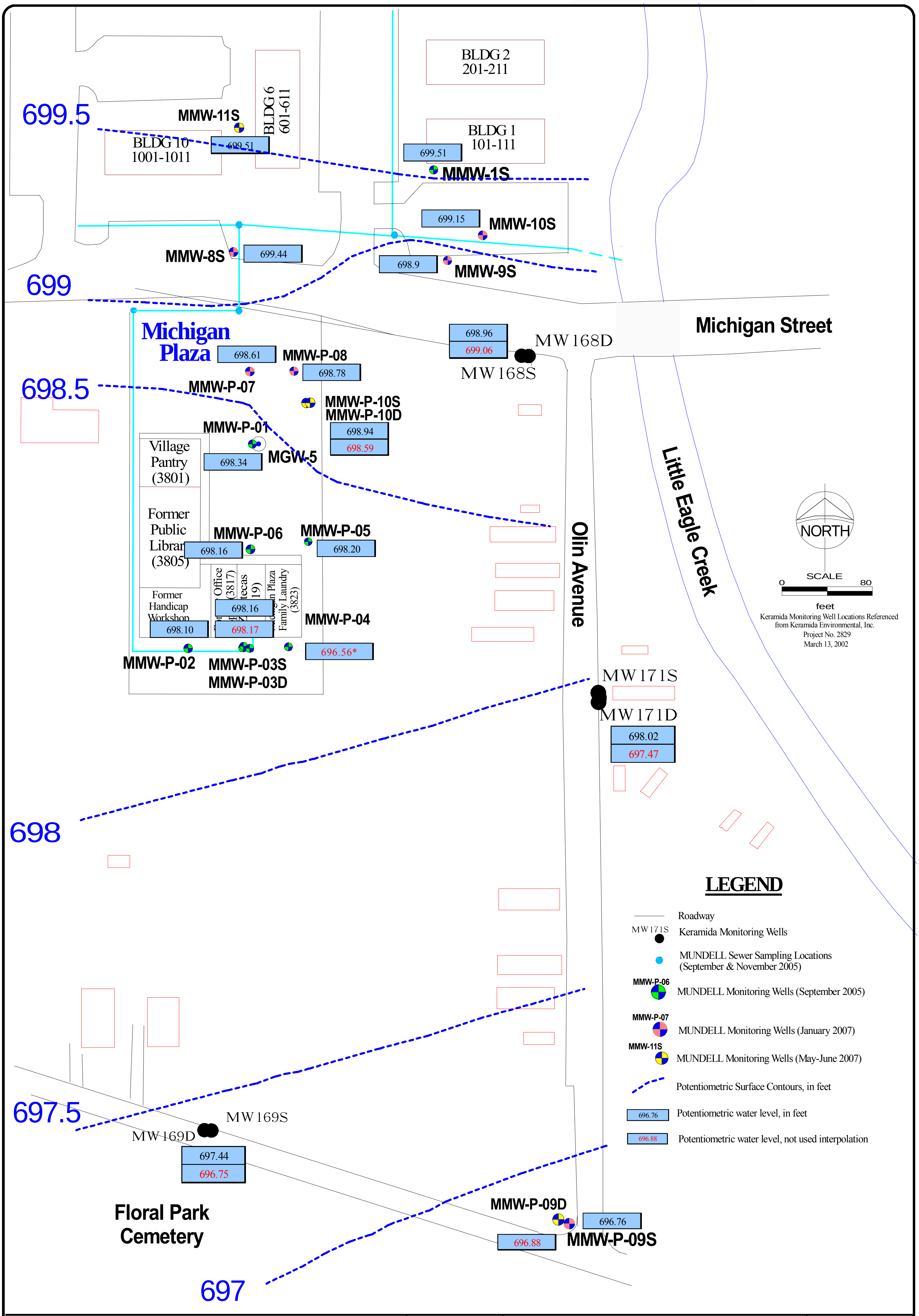
REVISED FROM MUNDELL 4Q 2007 QUARTERLY MONITORING REPORT

MUNDELL & ASSOCIATES, INC.
Consulting Professionals for the Earth & Environment
110 South Downey Avenue
Indianapolis, Indiana 46219
317-630-9060, fax 317-630-9065

Project Number: M01046	
Drawing File: Basemap_rev2	
Date Prepared: 2/4/08	
Scale: 1"=80'6	

POTENTIOMETRIC SURFACE MAP
December 12-14, 2007
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana

FIGURE
8



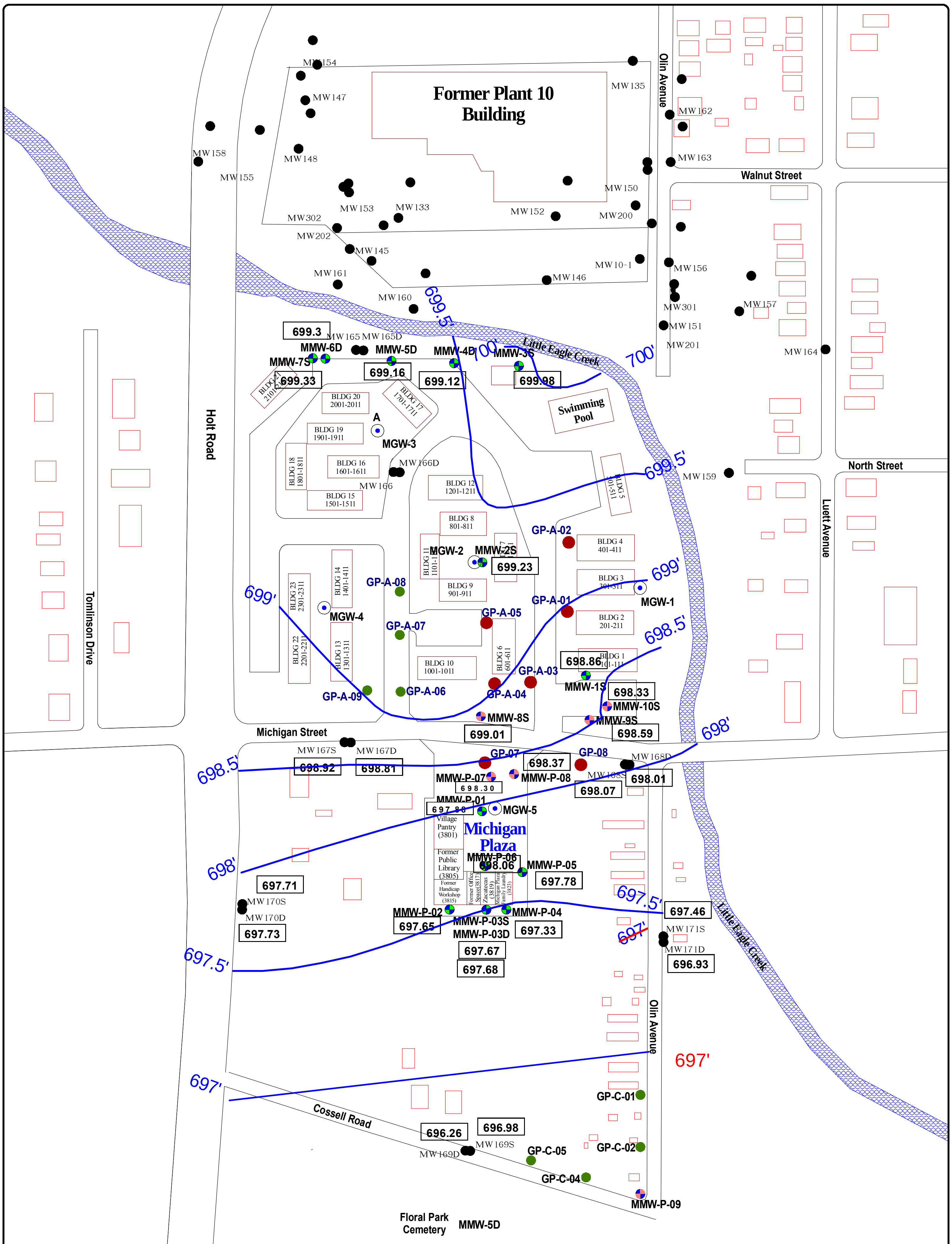
MUNDELL & ASSOCIATES, INC.
Consulting Professionals for the Earth & Environment

110 South Downey Avenue
Indianapolis, Indiana 46219
317-630-9060, fax 317-630-9065

Project Number:	M01046
Drawing File:	Basemap_rev2
Date Prepared:	4/16/08
Scale:	1"=80' ±

POTENTIOMETRIC SURFACE MAP
March 21, 2008
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana

FIGURE
9



LEGEND

	Fence
MW160	Keramida Monitoring Wells
SS-P-01	MUNDELL Sewer Sampling Locations (September & November 2005)
GP-07	MUNDELL Soil Boring Locations (September 2005)
MMW-P-06	MUNDELL Monitoring Wells, Michigan Plaza (September 2005)
GP-C-05	MUNDELL Soil Boring Locations (January 2007)
MMW-P-07	MUNDELL Monitoring Wells (January 2007)
	Water Level as Measured on February 21, 2007
	Potentiometric Surface Equal Potential Lines

Revised from MUNDELL 2Q 2009 Quarterly Monitoring Report

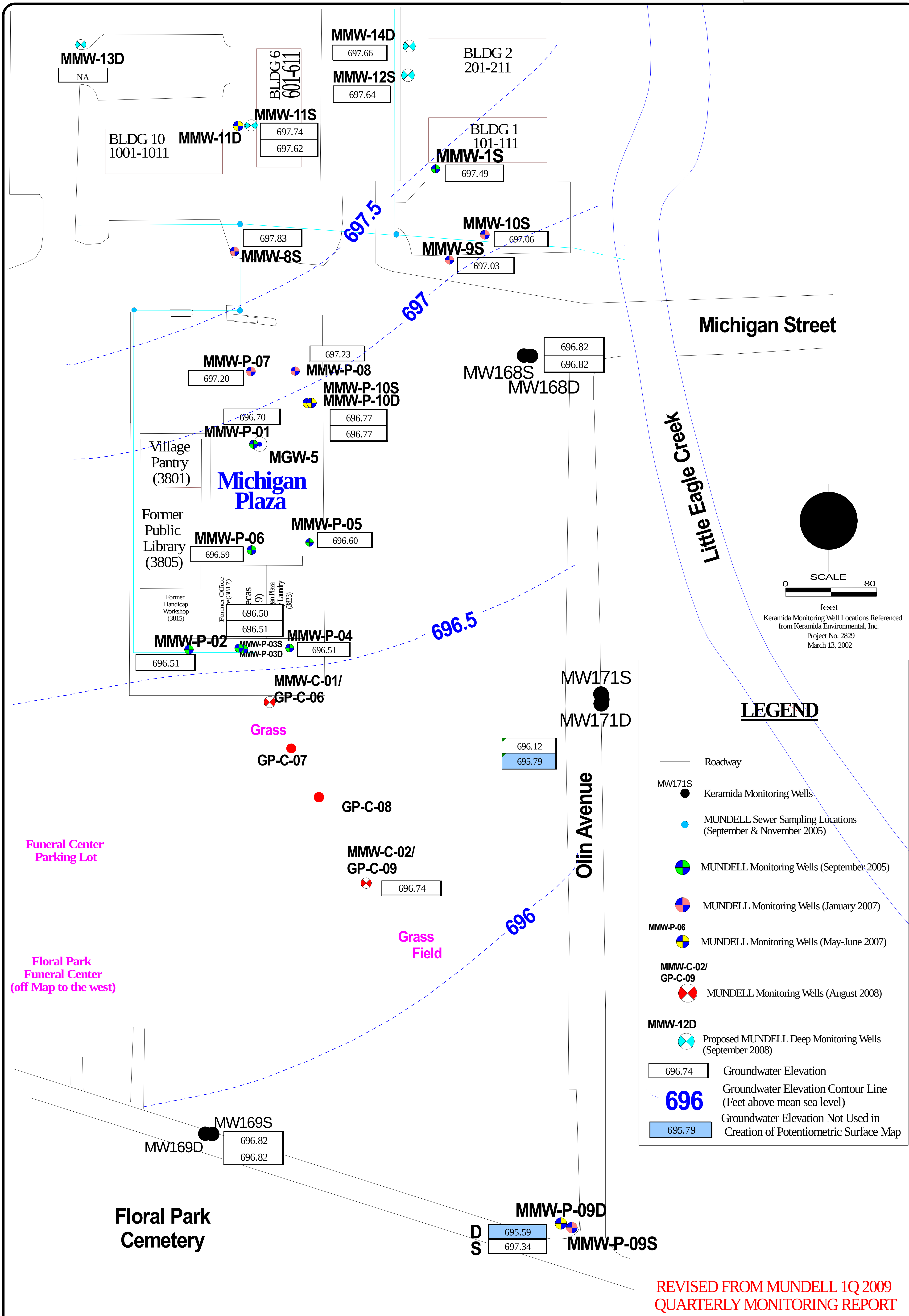
Keramida Monitoring Well Locations Referenced from Keramida Environmental, Inc.
Project No. 2829
March 13, 2002

MUNDELL & ASSOCIATES, INC.
Consulting Professionals for the Earth & Environment
429 East Vermont Street, Suite 200
Indianapolis, Indiana 46202-3688
317-630-9060, fax 317-630-9065

Project Number: M01046
Drawing File: Base Map.SKF
Date Prepared: 6/23/08
Scale: 1"=200'±

Shallow Potentiometric Surface Map
June 2, 2008
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana

FIGURE
10

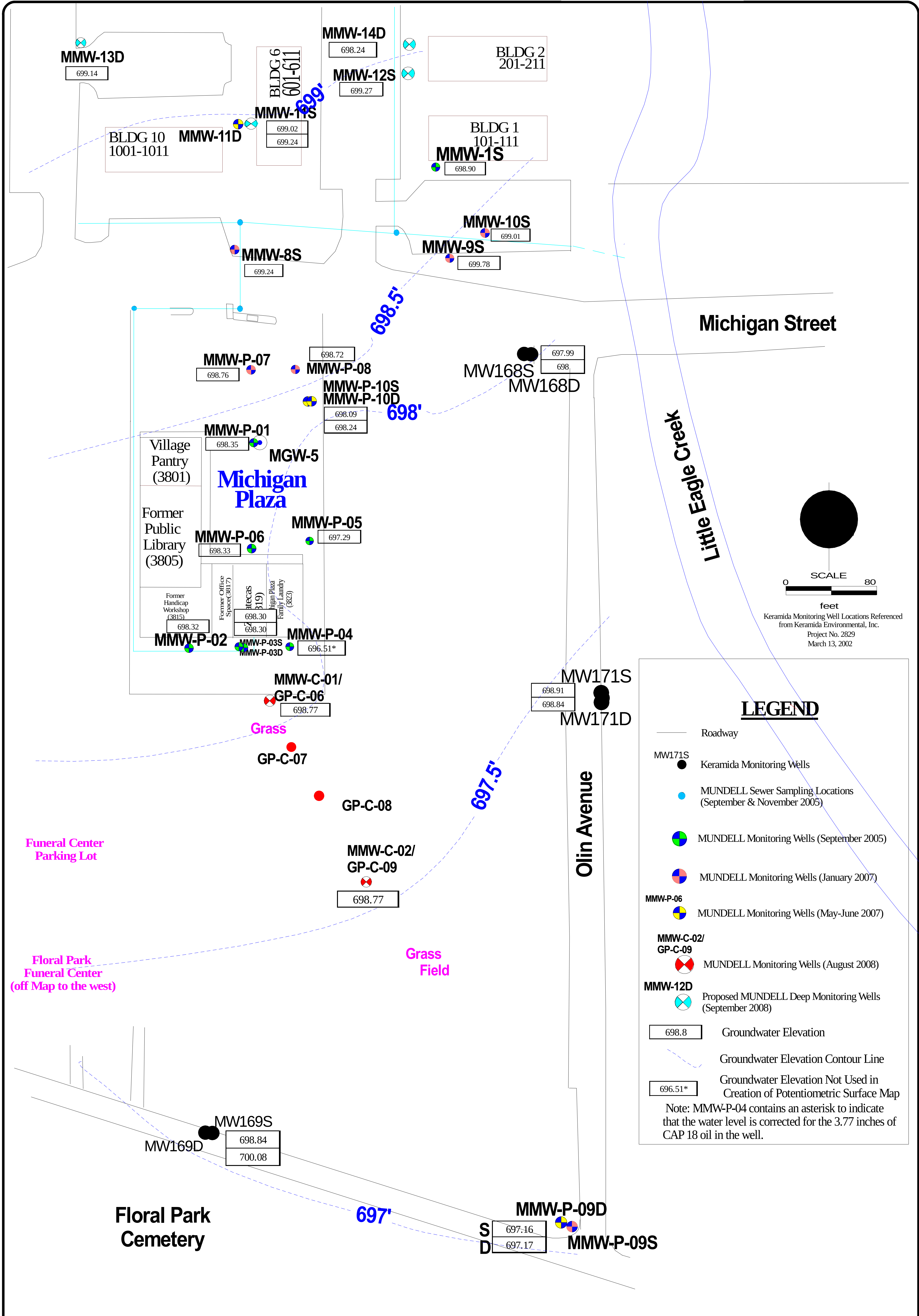


MUNDELL & ASSOCIATES, INC.
Consulting Professionals for the Earth & Environment
110 South Downey Avenue
Indianapolis, Indiana 46219
317-630-9060, fax 317-630-9065

Project Number: M01046
Drawing File:
Date Prepared: 7/27/09
Scale: 1"=80'

Potentiometric Surface Map
March 17, 2009
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana

FIGURE
11



MUNDELL & ASSOCIATES, INC.
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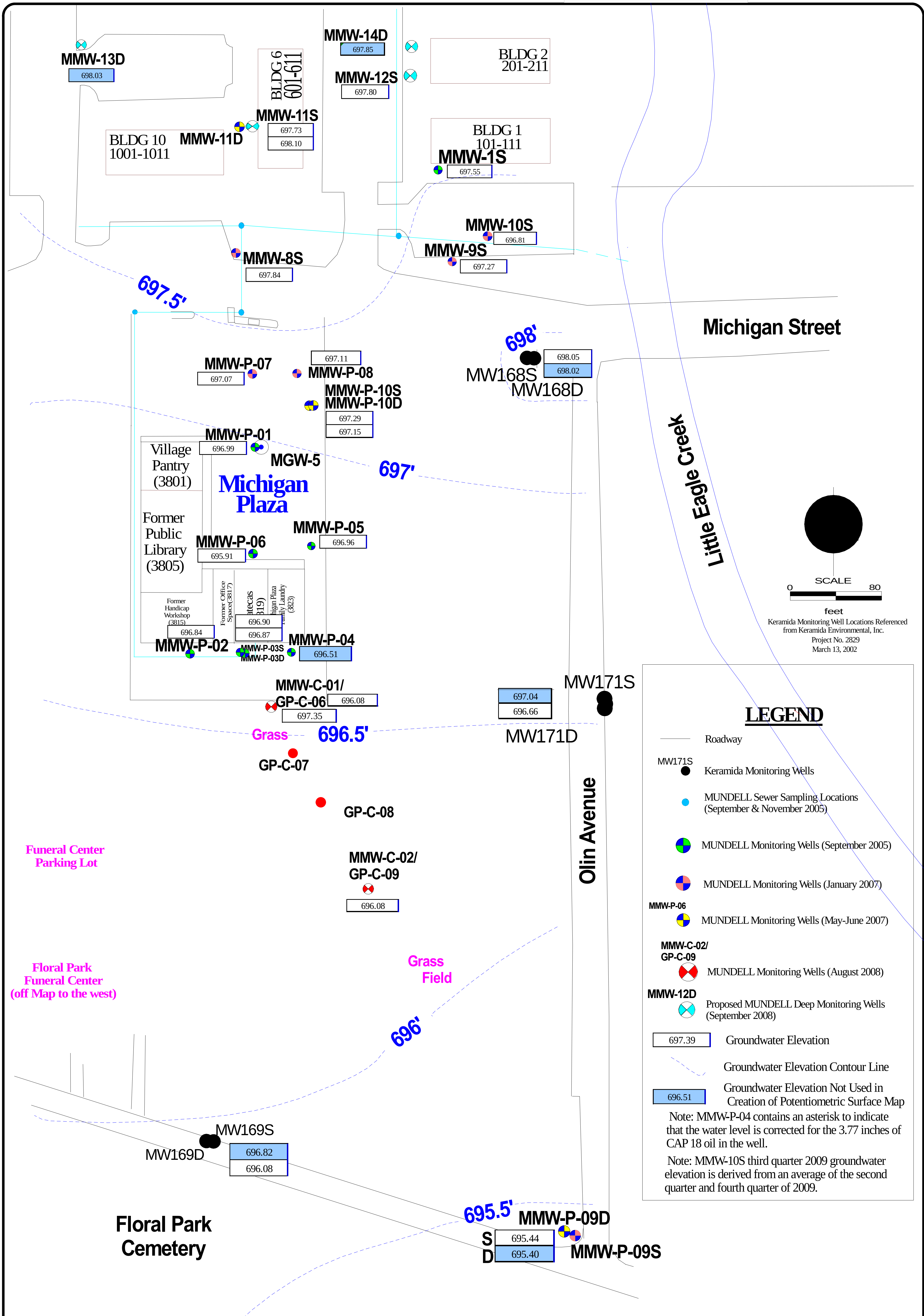
110 South Downey Avenue
Indianapolis, Indiana 46219
317-630-9060, fax 317-630-9065

Project Number:	M01046
Drawing File:	
Date Prepared:	7/27/09
Scale:	1"=80'

Potentiometric Surface Map
June 15, 2009
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana

FIGURE
12



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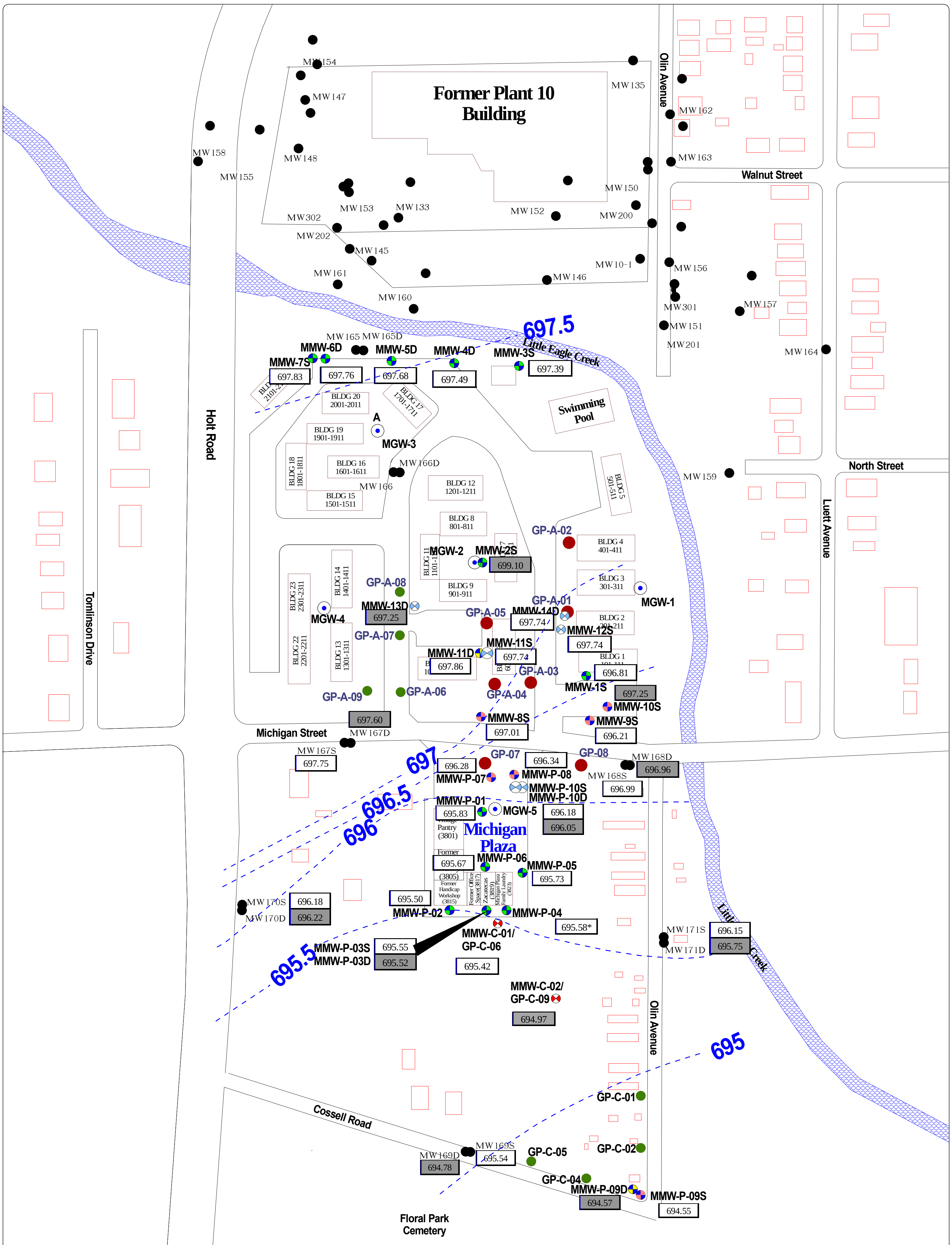
Consulting Professionals for the Earth & Environment
110 South Downey Avenue
Indianapolis, Indiana 46219
317-630-9060, fax 317-630-9065

Project Number: M01046	
Drawing File:	
Date Prepared: 7/27/09	
Scale: 1"=80'	

Potentiometric Surface Map
August 5, 2009
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana

FIGURE
13



LEGEND

	Fence
MW160	Keramida Monitoring Wells
SS-P-01	MUNDELL Sewer Sampling Locations (September & November 2005)
GP-07	MUNDELL Soil Boring Locations (September 2005)
MMW-P-06	MUNDELL Monitoring Wells, Michigan Plaza (September 2005)
GP-C-05	MUNDELL Soil Boring Locations (January 2007)
MMW-P-07	MUNDELL Monitoring Wells (January 2007)
MMW-P-09D	MUNDELL Monitoring Wells (May-June 2007)
MMW-C-01/ GP-C-06	MUNDELL Monitoring Wells (August 2008)
MMW-11S	MUNDELL Monitoring Wells (September 2008)
697.03	Water Level as Measured on November 2, 2009 (gray boxes indicate groundwater elevation values not used for the creation of the Potentiometric Surface Map)
699	Potentiometric Surface Equal Potential Lines

NORTH

SCALE

0 200

feet

Keramida Monitoring Well Locations Referenced from Keramida Environmental, Inc.
Project No. 2829
March 13, 2002

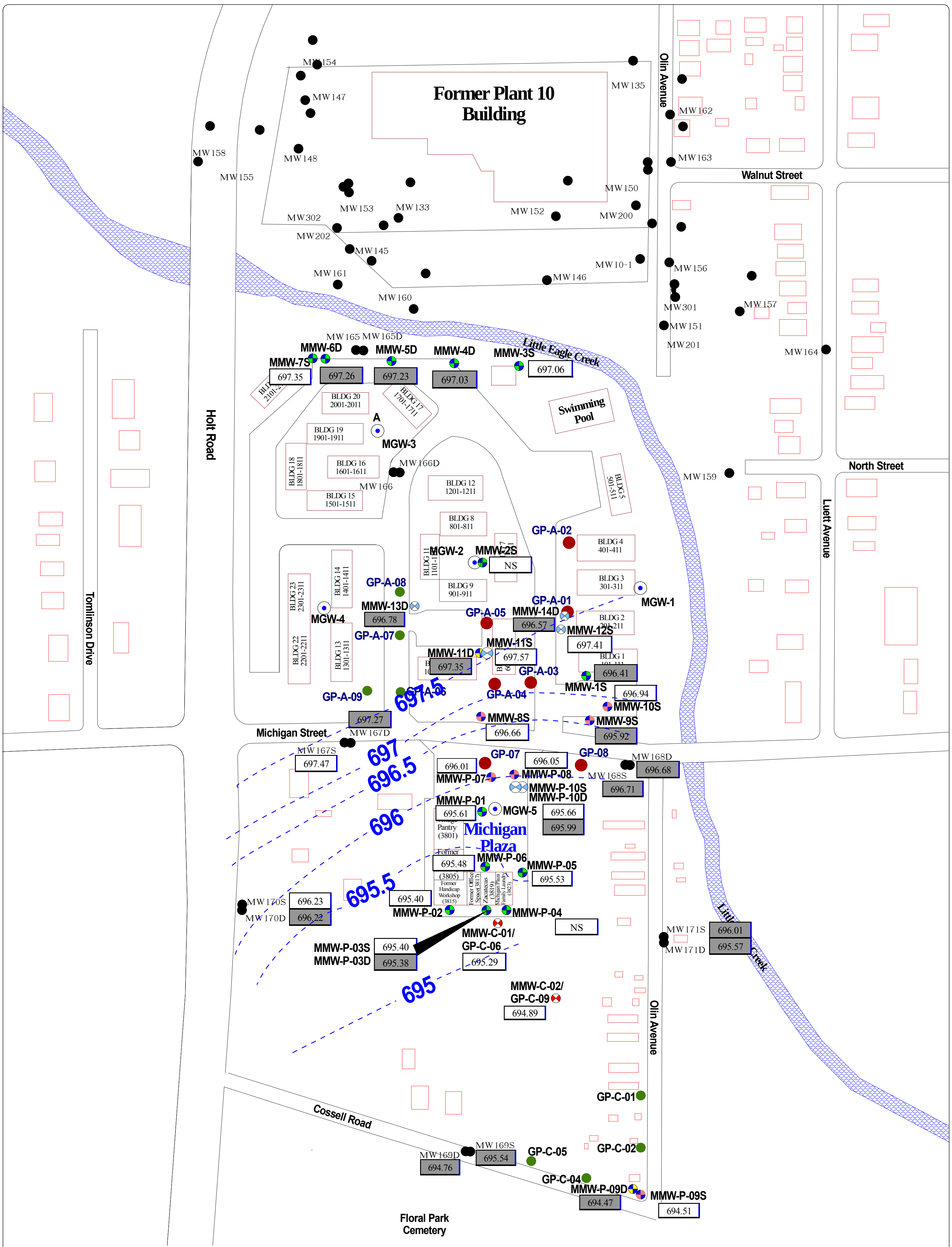
REVISED FROM MUNDELL 4Q 2009 QUARTERLY MONITORING REPORT

MUNDELL & ASSOCIATES, INC.
Consulting Professionals for the Earth & Environment
110 South Downey Avenue
Indianapolis, Indiana 46219-6406
317-630-9060, fax 317-630-9065

Project Number: M01046
Drawing File: Base Map.SKF
Date Prepared: 12/29/09
Scale: 1"=200'±

Shallow Potentiometric Surface Map
November 2, 2009
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana

FIGURE
14



LEGEND

	Fence
MW160 ●	Keramida Monitoring Wells
SS-P-01	MUNDELL Sewer Sampling Locations (September & November 2005)
GP-07	MUNDELL Soil Boring Locations (September 2005)
MMW-P-06	MUNDELL Monitoring Wells, Michigan Plaza (September 2005)
GP-C-05	MUNDELL Soil Boring Locations (January 2007)
MMW-P-07	MUNDELL Monitoring Wells (January 2007)
MMW-P-09D	MUNDELL Monitoring Wells (May-June 2007)
MMW-C-01/ GP-C-06	MUNDELL Monitoring Wells (August 2008)
MMW-11S	MUNDELL Monitoring Wells (September 2008)
697.03	Water Level as Measured on February 3, 2010 (gray boxes indicate groundwater elevation values not used for the creation of the Potentiometric Surface Map)
699	Potentiometric Surface Equal Potential Lines

NORTH

SCALE
0 200
feet

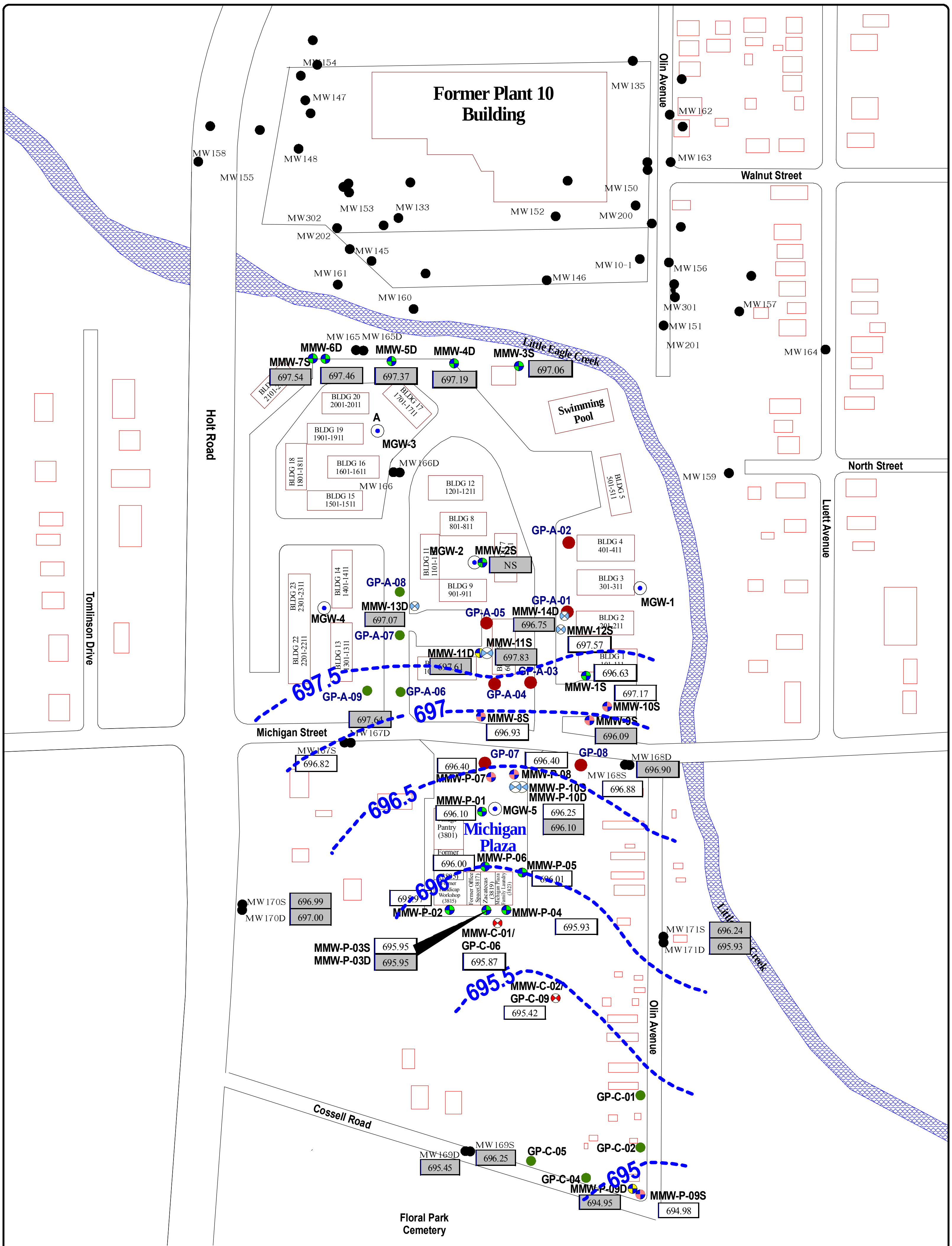
Keramida Monitoring Well Locations Referenced from Keramida Environmental, Inc.
Project No. 2829
March 13, 2002

MUNDELL & ASSOCIATES, INC.
Consulting Professionals for the Earth & Environment
110 South Downey Avenue
Indianapolis, Indiana 46219-6406
317-630-9060, fax 317-630-9065

Project Number: M01046
Drawing File: Base Map.SKF
Date Prepared: 2/12/10
Scale: 1"=200'±

Shallow Potentiometric Surface Map
February 3rd, 2010
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana

FIGURE
15



LEGEND

Fence

MW160 Keramida Monitoring Wells

SS-P-01 MUNDELL Sewer Sampling Locations (September & November 2005)

GP-07 MUNDELL Soil Boring Locations (September 2005)

MMW-P-06 MUNDELL Monitoring Wells, Michigan Plaza (September 2005)

GP-C-05 MUNDELL Soil Boring Locations (January 2007)

MMW-P-07 MUNDELL Monitoring Wells (January 2007)

MMW-P-09D MUNDELL Monitoring Wells (May-June 2007)

MMW-C-01/ GP-C-06 MUNDELL Monitoring Wells (August 2008)

MMW-11S MUNDELL Monitoring Wells (September 2008)

697.03 Water Level as Measured on February 3, 2010 (gray boxes indicate groundwater elevation values not used for the creation of the Potentiometric Surface Map)

699 Potentiometric Surface Equal Potential Lines

NORTH

SCALE

0 200

feet

Keramida Monitoring Well Locations Referenced from Keramida Environmental, Inc.
Project No. 2829
March 13, 2002

MUNDELL & ASSOCIATES, INC.

Consulting Professionals for the Earth & Environment

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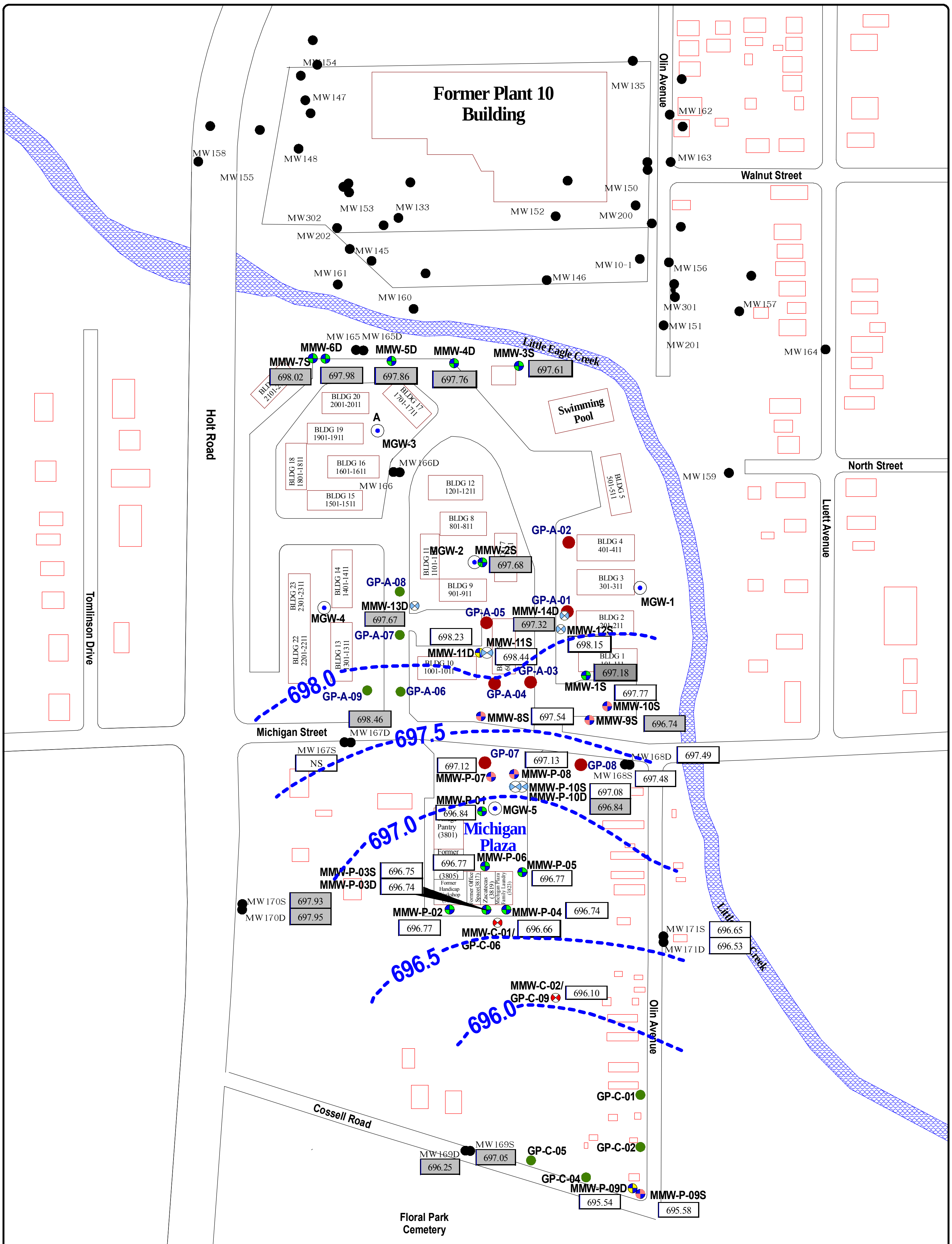
Indianapolis, Indiana 46219-6406
317-630-9060, fax 317-630-9065

Project Number: M01046
Drawing File: Base Map.SKF
Date Prepared: 5/3/10
Scale: 1"=200'±

Shallow Potentiometric Surface Map
April 20, 2010
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana

FIGURE 16



LEGEND

	Fence
MW160	Environ Monitoring Wells
SS-P-01	MUNDELL Sewer Sampling Locations (September & November 2005)
GP-07	MUNDELL Soil Boring Locations (September 2005)
MMW-P-06	MUNDELL Monitoring Wells, Michigan Plaza (September 2005)
GP-C-05	MUNDELL Soil Boring Locations (January 2007)
MMW-P-07	MUNDELL Monitoring Wells (January 2007)
MMW-P-09D	MUNDELL Monitoring Wells (May-June 2007)
MMW-C-01/ GP-C-06	MUNDELL Monitoring Wells (August 2008)
MMW-11S	MUNDELL Monitoring Wells (September 2008)
697.03	Water Level as Measured on July 20, 2010 (gray boxes indicate groundwater elevation values not used for the creation of the Potentiometric Surface Map)
699	Potentiometric Surface Equal Potential Lines

NORTH

SCALE
0 200
feet

Keramida Monitoring Well Locations Referenced
from Keramida Environmental, Inc.
Project No. 2829
March 13, 2002

MUNDELL & ASSOCIATES, INC.

Consulting Professionals for the Earth & Environment

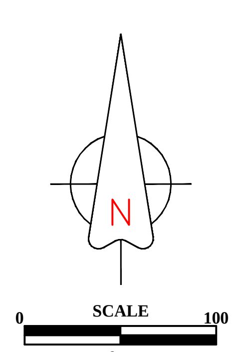
110 South Downey Avenue
Indianapolis, Indiana 46219-6406
317-630-9060, fax 317-630-9065

Project Number:
M01046
Drawing File:
Base Map.SKF
Date Prepared:
9/21/10
Scale:
1"=200' ±

Shallow Potentiometric Surface Map
July 20, 2010
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana

FIGURE
17

LEGEND



Mundell
Consulting Professionals
for the Earth and the Environment

110 South Downey Avenue
Indianapolis, Indiana 46219
317-630-9060, fax 317-630-9065
www.MundellAssociates.com

Project Number: M01046	
Drawing File: IDEM Response	
Date Prepared: 4-15-2013	
Scale: 1"= 100'	

METHANE SOIL GAS ANALYTICAL RESULTS

Michigan Plaza

3801 - 3823 West Michigan Street

Indianapolis, INDIANA

FIGURE 18

ATTACHMENT 1

1st Quarter 2013 Groundwater Monitoring Results

Table 2
Monitoring Well Groundwater Analytical Results
Quarter 1 - 2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

Well ID	Sample Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Chloroform	Vinyl chloride
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
IDEM RISC Default Industrial Cleanup Level		**55**	**31**	**1,000**	**2,000**	**1,000**	**4**
IDEM RISC Default Residential Cleanup Level		**5**	**5**	**70**	**100**	**80**	**2**
Monitoring Wells (Apts)							
Shallow Wells							
MMW-1S	2/28/2013	**477**	**20.5**	6.6	<5.0	<5.0	<2.0
MMW-8S	2/28/2013	**6.2**	<5.0	9.4	<5.0	<5.0	**152**
MMW-9S	2/28/2013	**11.5**	**9.2**	**1,990**	48.6	<5.0	**843**
MMW-10S	2/28/2013	**41.8**	**25.5**	**294**	9.2	<5.0	**273**
MMW-11S	3/4/2013	<5.0	<5.0	5.2	<5.0	<5.0	<2.0
MMW-12S	3/4/2013	<5.0	<5.0	42.8	<5.0	<5.0	**2.3**
MMW-15S	3/6/2013	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
Deep Wells							
MMW-4D	3/5/2013	<5.0	<5.0	**396**	<5.0	<5.0	**202**
MMW-6D	3/5/2013	<5.0	<5.0	<5.0	<5.0	<5.0	**61.1**
MMW-11D	3/4/2013	<5.0	<5.0	**221**	18.9	<5.0	<2.0
MMW-13D	3/4/2013	<5.0	<5.0	**374**	<5.0	<5.0	**21.7**
MMW-14D	3/4/2013	<5.0	<5.0	**983**	16.2	<5.0	**96.4**
MMW-15D	3/6/2013	<5.0	<5.0	10	<5.0	<5.0	**2.7**

Table 2
Monitoring Well Groundwater Analytical Results
Quarter 1 - 2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

Well ID	Sample Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Chloroform	Vinyl chloride
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
IDEM RISC Default Industrial Cleanup Level		**55**	**31**	**1,000**	**2,000**	**1,000**	**4**
IDEM RISC Default Residential Cleanup Level		**5**	**5**	**70**	**100**	**80**	**2**
Monitoring Wells (Plaza)							
Shallow Wells							
MMW-P-01	3/4/2013	**24.4**	**12.4**	**527**	12.9	<5.0	**2,810**
MMW-P-02	3/4/2013	<5.0	<5.0	52.5	<5.0	<5.0	**347**
MMW-P-03S	3/4/2013	<5.0	<5.0	49.4	<5.0	<5.0	**124**
MMW-P-04	3/9/2013	**28.2**	<5.0	50.1	<5.0	<5.0	**6.1**
MMW-P-05	3/4/2013	<5.0	<5.0	<5.0	<5.0	<5.0	**173**
MMW-P-06	3/4/2013	<50.0	<50.0	**2,230**	<50.0	<50.0	**5,010**
MMW-P-07	3/4/2013	<5.0	<5.0	23.9	<5.0	<5.0	**386**
MMW-P-08	3/4/2013	<5.0	<5.0	**111**	<5.0	<5.0	**934**
MMW-P-09S	3/5/2013	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
MMW-P-10S	2/28/2013	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
MMW-P-12S	3/9/2013	<5.0	<5.0	**505**	18.0	<5.0	**63.0**
Deep Wells							
MMW-P-03D	3/4/2013	<5.0	<5.0	<5.0	<5.0	<5.0	**51.7**
MMW-P-09D	3/5/2013	<5.0	<5.0	<5.0	<5.0	<5.0	**96.4**
MMW-P-10D	2/28/2013	<5.0	<5.0	8.9	<5.0	<5.0	**181**
MMW-P-12D	3/9/2013	<5.0	<5.0	**619**	20.6	<5.0	**71.4**

Table 2
Monitoring Well Groundwater Analytical Results
Quarter 1 - 2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

Well ID	Sample Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Chloroform	Vinyl chloride
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
IDEM RISC Default Industrial Cleanup Level		**55**	**31**	**1,000**	**2,000**	**1,000**	**4**
IDEM RISC Default Residential Cleanup Level		**5**	**5**	**70**	**100**	**80**	**2**
Floral Park Monitoring Wells (Off-site)							
Shallow Wells							
MMW-C-01	3/5/2013	**17.5**	<5.0	<5.0	<5.0	<5.0	**10.1**
MMW-C-02S	3/5/2013	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
MMW-C-16S	3/6/2013	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
MMW-P-11S	3/6/2013	**703**	<5.0	<5.0	<5.0	<5.0	**18.8**
MMW-P-13S	3/7/2013	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
MMW-P-14S	3/7/2013	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
Deep Wells							
MMW-C-02D	3/7/2013	<5.0	<5.0	<5.0	<5.0	<5.0	**162**
MMW-C-16D	3/6/2013	<5.0	<5.0	<5.0	<5.0	<5.0	**316**
MMW-C-17D	3/7/2013	<5.0	<5.0	<5.0	<5.0	<5.0	**2.1**
MMW-P-11DR	3/6/2013	<5.0	<5.0	10.6	<5.0	<5.0	**201**
MMW-P-13D	3/7/2013	<5.0	<5.0	<5.0	<5.0	<5.0	**140**
MMW-P-14D	3/7/2013	<5.0	<5.0	<5.0	<5.0	<5.0	**32.3**

Table 2
Monitoring Well Groundwater Analytical Results
Quarter 1 - 2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

Well ID	Sample Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Chloroform	Vinyl chloride
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
IDEM RISC Default Industrial Cleanup Level		**55**	**31**	**1,000**	**2,000**	**1,000**	**4**
IDEM RISC Default Residential Cleanup Level		**5**	**5**	**70**	**100**	**80**	**2**
Keramida/ENVIRON Monitoring Wells (Off-Site)							
Shallow Wells							
MW-167S	3/8/2013	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
MW-168S	3/8/2013	**76.0**	**11.7**	**75.7**	<5.0	<5.0	**57.1**
MW-170S	3/8/2013	<5.0	<5.0	7.9	<5.0	<5.0	<2.0
Deep Wells							
MW-167D	3/8/2013	<5.0	<5.0	**382**	19.1	<5.0	**13.5**
MW-168D	3/8/2013	<5.0	<5.0	<5.0	<5.0	<5.0	**80.5**
MW-170D	3/8/2013	<5.0	<5.0	<5.0	<5.0	<5.0	**76.9**

Notes:

Exceedances of IDEM RISC Industrial Default Cleanup Level in **RED**
Exceedances of IDEM RISC Residential Default Cleanup Level in **BLUE**
PCE = Tetrachloroethene; TCE = Trichloroethene; cis-1,2-DCE = cis-1,2-Dichloroethene; trans-1,2-DCE = trans-1,2-Dichloroethene
NS = Not Sampled
NA = Not Analyzed
All analytical results presented in micrograms per liter (ug/L).

Table 3
Cumulative Monitoring Well Groundwater Analytical Results
Quarter 1 - 2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

Well ID	Sample Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Chloroform	Vinyl chloride
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
IDEM RISC Industrial Default Cleanup Level - 2006		**55**	**31**	**1,000**	**2,000**	**1,000**	**4**
IDEM RISC Residential Default Cleanup Level - 2006		**5**	**5**	**70**	**100**	**80**	**2**
Monitoring Wells (Apts)							
Shallow Wells							
MMW-1S	9/10/2004	< 5.0	< 5.0	< 5.0	< 5.0	<5.0	**4.1**
	3/15/2005	**150**	**10.0**	< 5.0	< 5.0	< 5.0	< 2.0
	11/9/2005	**130**	**8.3**	<5.0	<5.0	<5.0	**8.9**
	9/5/2006	**200**	**13.0**	<5.0	<5.0	<5.0	**4.6**
	2/22/2007	**220**	**14.9**	<5.0	<5.0	<5.0	<2.0
	6/14/2007	**240**	<5.0	<5.0	<5.0	<5.0	<2.0
	9/19/2007	**362**	**10.5**	<5.0	<5.0	31.6	<2.0
	12/13/2007	**330**	**8.1**	<5.0	<5.0	27.0	<2.0
	3/21/2008	**280**	**14.0**	<5.0	<5.0	<5.0	<2.0
	6/6/2008	**277**	**13.2**	<5.0	<5.0	<5.0	<2.0
	9/11/2008	**288**	**14.7**	<5.0	<5.0	<5.0	<2.0
	11/20/2008	**223**	**45.5**	**169**	<5.0	<5.0	**14.5**
	3/16/2009	**199**	**11.3**	<5.0	<5.0	<5.0	<2.0
	6/16/2009	**237**	**13.4**	<5.0	<5.0	<5.0	<2.0
	8/5/2009	**195**	**22.9**	**71.3**	<5.0	<5.0	**9.3**
	11/2/2009	**189**	**39.0**	**119**	<5.0	<5.0	**26.6**
	2/3/2010	**160**	**49.7**	59.1	<5.0	<5.0	**35.4**
	4/22/2010	**206**	**14.7**	<5.0	<5.0	<5.0	<2.0
	7/21/2010	**310**	**21.8**	<5.0	<5.0	<5.0	<2.0
	10/12/2010	**89.4**	**21.3**	**208**	<5.0	<5.0	**32.2**
	1/19/2011	**217**	**46.2**	35.4	<5.0	<5.0	**21.8**
	5/4/2011	**449**	**22.7**	12.1	<5.0	<5.0	<2.0
	7/28/2011	**334**	**20.3**	8.1	<5.0	<5.0	**2.1**
	10/19/2011	**136**	**66.0**	**75.3**	<5.0	<5.0	**14.3**
	2/14/2012	**219**	**9.7**	<5.0	<5.0	<5.0	<2.0
	4/25/2012	**270**	**11.2**	34.2	<5.0	<5.0	**39.0**
	8/2/2012	**292**	**27.9**	<5.0	<5.0	<5.0	**28.5**
	11/15/2012	**413**	**20.0**	5.1	<5.0	<5.0	<2.0
	2/28/2013	**477**	**20.5**	6.6	<5.0	<5.0	<2.0
MMW-2S	9/10/2004	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	11/9/2005	<5.0	<5.0	<5.0	<5.0	<5.0	**5.2**
	9/5/2006	<5.0	<5.0	<5.0	<5.0	<5.0	**5.2**
	2/22/2007	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	6/2/2008	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	6/15/2009	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/22/2010	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/30/2011	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/23/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
MMW-3S	8/26/2004	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	9/10/2004	<5.0	**5.2**	<5.0	<5.0	<5.0	<2.0
	11/9/2005	<5.0	**28.0**	5.4	<5.0	<5.0	<2.0
	9/5/2006	<5.0	**23.0**	7.4	<5.0	<5.0	<2.0
	2/22/2007	<5.0	**20.6**	8.5	<5.0	<5.0	<2.0
	6/2/2008	<5.0	**20.2**	7.9	<5.0	<5.0	**2.8**
	6/15/2009	<5.0	**15.3**	11.7	<5.0	<5.0	**3.0**
	4/20/2010	<5.0	**15.9**	8.0	<5.0	<5.0	<2.0
	5/4/2011	<5.0	**12.4**	12.4	<5.0	<5.0	**4.4**
	4/23/2012	<5.0	**9.9**	5.8	<5.0	<5.0	<2.0
MMW-7S	8/24/2004	<5.0	<5.0	28.0	<5.0	<5.0	<2.0
	9/10/2004	<5.0	<5.0	8.5	<5.0	<5.0	<2.0
	11/9/2005	<5.0	<5.0	9.5	<5.0	<5.0	<2.0
	9/5/2006	<5.0	<5.0	5.8	<5.0	<5.0	**4.5**
	2/21/2007	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	6/2/2008	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	6/15/2009	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/20/2010	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	5/4/2011	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/26/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0

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Quarter 1 - 2013
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MUNDELL Project No.: M01046

Well ID	Sample Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Chloroform	Vinyl chloride
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
IDEM RISC Industrial Default Cleanup Level - 2006		55	31	1,000	2,000	1,000	4
IDEM RISC Residential Default Cleanup Level - 2006		5	5	70	100	80	2
MMW-8S	2/22/2007	114	<5.0	289	13.8	<5.0	40.6
	6/14/2007	15.9	<5.0	364	9.5	<5.0	82.1
	9/19/2007	<5.0	<5.0	778	24.6	<5.0	145
	12/13/2007	7.7	<5.0	1,000	7.4	<5.0	586
	3/20/2008	<5.0	<5.0	470	<5.0	<5.0	330
	6/6/2008	<5.0	<5.0	336	<5.0	<5.0	509
	9/10/2008	<5.0	<5.0	275	<5.0	<5.0	322
	11/20/2008	<5.0	<5.0	123	<5.0	<5.0	584
	3/16/2009	<5.0	<5.0	95.0	<5.0	<5.0	348
	6/16/2009	<5.0	<5.0	94.3	6.1	<5.0	280
	8/5/2009	<5.0	<5.0	83.8	<5.0	<5.0	261
	11/2/2009	<5.0	<5.0	58.3	<5.0	<5.0	277
	2/3/2010	7.9	<5.0	15.3	<5.0	<5.0	236
	4/22/2010	<5.0	<5.0	9.0	<5.0	<5.0	151
	7/21/2010	6.2	<5.0	14.9	<5.0	5.0	230
	10/12/2010	8.4	<5.0	5.4	<5.0	<5.0	158
	1/19/2011	14.1	<5.0	<5.0	<5.0	<5.0	172
	4/30/2011	677	19.5	37.2	<5.0	<5.0	108
	7/28/2011	19.4	<5.0	29.0	<5.0	<5.0	130
	10/24/2011	7.9	<5.0	9.9	<5.0	<5.0	200
	2/14/2012	<5.0	<5.0	12.6	<5.0	<5.0	148
	4/25/2012	<5.0	<5.0	15.6	<5.0	<5.0	90.6
	8/2/2012	5.1	<5.0	8.5	<5.0	<5.0	139
	11/15/2012	6.8	<5.0	10.0	<5.0	<5.0	127
	2/28/2013	6.2	<5.0	9.4	<5.0	<5.0	152
MMW-9S	2/22/2007	782	88.6	78.9	<5.0	<5.0	<2.0
	6/14/2007	858	85.7	65.3	<5.0	<5.0	<2.0
	9/20/2007	1,430	112	70.3	8.2	<5.0	<2.0
	12/12/2007	<50.0	<50.0	1,700	<50.0	<50.0	<20.0
	3/21/2008	57.0	20.0	2,900	39.0	<5.0	16.0
	6/6/2008	52.9	28.0	1,540	38.2	<5.0	295
	9/10/2008	52.6	22.7	4,920	94.5	<5.0	167
	11/20/2008	<5.0	<5.0	5,820	90.2	<5.0	1,010
	3/16/2009	<50.0	<50.0	7,490	73.8	<50.0	1,800
	6/16/2009	44.5	24.9	4,810	64.0	<5.0	876
	8/5/2009	<5.0	<5.0	5,010	64.2	<5.0	1,110
	11/2/2009	<5.0	<5.0	5,410	120	<5.0	1,050
	2/3/2010	<50.0	<50.0	5,090	98.4	<50.0	1,700
	4/22/2010	<5.0	<5.0	4,300	77.1	<5.0	1,710
	7/21/2010	<50.0	<50.0	2,910	73.2	<50.0	2,020
	10/12/2010	<50.0	<50.0	2,430	<50.0	<50.0	1,270
	1/19/2011	<50.0	<50.0	1,580	136	<50.0	1,490
	5/4/2011	11.1	13.4	2,900	71.7	<5.0	1,350
	7/27/2011	<5.0	<5.0	933	32.0	<5.0	747
	10/24/2011	<5.0	<5.0	2,330	92.8	<5.0	694
	2/14/2012	<25.0	<25.0	2,040	60.8	<25.0	1,140
	4/25/2012	<5.0	<5.0	1,180	30.1	<5.0	753
	8/2/2012	<5.0	<5.0	667	30.2	<5.0	667
	11/14/2012	9.8	5.0	2,000	58.0	<5.0	893
	2/28/2013	11.5	9.2	1,990	48.6	<5.0	843

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Well ID	Sample Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Chloroform	Vinyl chloride
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
IDEM RISC Industrial Default Cleanup Level - 2006		55	31	1,000	2,000	1,000	4
IDEM RISC Residential Default Cleanup Level - 2006		5	5	70	100	80	2
MMW-10S	2/22/2007	49.6	<5.0	<5.0	<5.0	<5.0	<2.0
	6/14/2007	77.6	<5.0	<5.0	<5.0	<5.0	<2.0
	9/19/2007	66.0	<5.0	<5.0	<5.0	<5.0	<2.0
	12/12/2007	124	56.0	149	<5.0	<5.0	<2.0
	3/21/2008	440	12.0	8.1	<5.0	<5.0	12.0
	6/6/2008	541	62.1	218	<5.0	<5.0	30.4
	9/10/2008	6.9	<5.0	353	8.2	<5.0	<2.0
	11/20/2008	<5.0	<5.0	212	<5.0	<5.0	15.9
	3/16/2009	<5.0	<5.0	302	<5.0	<5.0	114
	6/16/2009	22.8	15.4	415	12.0	<5.0	81.4
	8/5/2009	<5.0	<5.0	224	5.5	<5.0	156
	11/2/2009	12.8	10.1	239	5.6	<5.0	119
	2/3/2010	8.3	7.5	180	5.1	<5.0	148
	4/22/2010	<5.0	7.9	165	<5.0	<5.0	143
	7/21/2010	15.6	9.7	267	8.3	<5.0	239
	10/12/2010	<5.0	<5.0	100	<5.0	<5.0	96.1
	1/19/2011	<5.0	14.4	80.9	12.7	<5.0	88.0
	5/4/2011	429	76.6	464	16.9	<5.0	130
	7/27/2011	24.5	14.3	206	7.2	<5.0	295
	10/19/2011	5.2	<5.0	134	<5.0	<5.0	198
	2/14/2012	35.0	21.6	357	6.7	<5.0	265
	4/24/2012	54.0	23.8	194	6.1	<5.0	196
	8/2/2012	<5.0	<5.0	111	<5.0	<5.0	256
	11/15/2012	23.0	21.7	309	13.2	<5.0	286
	2/28/2013	41.8	25.5	294	9.2	<5.0	273
MMW-11S	6/14/2007	<5.0	<5.0	225	6.8	<5.0	18.6
	9/19/2007	<5.0	<5.0	442	21.1	<5.0	30.1
	12/13/2007	7.2	<5.0	920	27.0	<5.0	49.0
	3/20/2008	<5.0	<5.0	420	17.0	<5.0	4.9
	6/5/2008	<5.0	<5.0	623	23.1	<5.0	26.7
	9/10/2008	<5.0	<5.0	327	18.3	<5.0	9.9
	11/20/2008	<5.0	<5.0	554	23.9	<5.0	18.5
	3/16/2009	<5.0	<5.0	37.6	<5.0	<5.0	<2.0
	6/16/2009	<5.0	<5.0	253	17.9	<5.0	2.8
	8/5/2009	<5.0	<5.0	80.7	5.5	<5.0	3.1
	11/2/2009	<5.0	<5.0	59.9	<5.0	<5.0	<2.0
	2/3/2010	<5.0	<5.0	29.4	<5.0	<5.0	<2.0
	4/22/2010	<5.0	<5.0	17.7	<5.0	<5.0	<2.0
	7/21/2010	<5.0	<5.0	120	7.4	<5.0	4.3
	10/12/2010	<5.0	<5.0	85.1	5.6	<5.0	<2.0
	1/19/2011	<5.0	<5.0	46.3	12.9	<5.0	<2.0
	4/30/2011	<5.0	<5.0	8.3	<5.0	<5.0	<2.0
	7/26/2011	<5.0	<5.0	15.1	<5.0	<5.0	<2.0
	10/21/2011	<5.0	<5.0	33.9	<5.0	<5.0	<2.0
	2/14/2012	<5.0	<5.0	5.4	<5.0	<5.0	<2.0
	4/24/2012	<5.0	<5.0	42.5	5.1	<5.0	<2.0
	7/31/2012	<5.0	<5.0	62.7	5.4	<5.0	<2.0
	11/13/2012	<5.0	<5.0	27.6	<5.0	<5.0	<2.0
	3/4/2013	<5.0	<5.0	5.2	<5.0	<5.0	<2.0
MMW-12S	6/16/2009	<5.0	<5.0	9.7	<5.0	<5.0	6.5
	8/5/2009	<5.0	<5.0	47.3	<5.0	<5.0	15.2
	11/2/2009	<5.0	<5.0	28.8	<5.0	<5.0	7.1
	2/3/2010	<5.0	<5.0	11.4	<5.0	<5.0	2.1
	4/20/2010	<5.0	<5.0	5.3	<5.0	<5.0	<2.0
	7/21/2010	<5.0	<5.0	25.4	<5.0	<5.0	7.3
	10/12/2010	<5.0	<5.0	16.8	<5.0	<5.0	<2.0
	1/18/2011	<5.0	<5.0	19.7	<5.0	<5.0	<2.0
	4/30/2011	<5.0	<5.0	30.6	<5.0	<5.0	2.7
	7/26/2011	<5.0	<5.0	24.3	<5.0	<5.0	<2.0
	10/18/2011	<5.0	<5.0	39.4	<5.0	<5.0	<2.0
	2/14/2012	<5.0	<5.0	24.0	<5.0	<5.0	<2.0
	4/23/2012	<5.0	<5.0	45.2	<5.0	<5.0	2.6
	7/31/2012	<5.0	<5.0	46.9	<5.0	<5.0	3.0
	11/13/2012	<5.0	<5.0	84.3	<5.0	<5.0	5.3
	3/4/2013	<5.0	<5.0	42.8	<5.0	<5.0	2.3

Table 3
Cumulative Monitoring Well Groundwater Analytical Results
Quarter 1 - 2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

Well ID	Sample Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Chloroform	Vinyl chloride
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
IDEM RISC Industrial Default Cleanup Level - 2006		**55**	**31**	**1,000**	**2,000**	**1,000**	**4**
IDEM RISC Residential Default Cleanup Level - 2006		**5**	**5**	**70**	**100**	**80**	**2**
MMW-15S	2/15/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/26/2012	<5.0	<5.0	11.2	<5.0	<5.0	<2.0
	8/6/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	11/21/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	3/6/2013	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
Deep Wells							
MMW-4D	8/25/2004	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	9/10/2004	<5.0	<5.0	**980**	<5.0	<5.0	**200**
	11/10/2005	<5.0	<5.0	**850**	<5.0	<5.0	**240**
	9/5/2006	<5.0	<5.0	**1,100**	<5.0	<5.0	**220**
	2/22/2007	<5.0	<5.0	**1,460**	<5.0	<5.0	**248**
	6/2/2008	<5.0	<5.0	**515**	<5.0	<5.0	**32.2**
	6/15/2009	<5.0	<5.0	**892**	7.0	<5.0	**142**
	4/20/2010	<5.0	<5.0	**719**	<5.0	<5.0	**237**
	4/29/2011	<5.0	<5.0	**1,050**	<5.0	<5.0	**164**
	2/14/2012	<5.0	<5.0	**639**	<5.0	<5.0	**237**
	4/23/2012	<5.0	<5.0	**338**	<5.0	<5.0	**176**
	7/31/2012	<5.0	<5.0	**347**	<5.0	<5.0	**129**
	11/13/2012	<5.0	<5.0	**463**	<5.0	<5.0	**164**
	3/5/2013	<5.0	<5.0	**396**	<5.0	<5.0	**202**
MMW-5D	8/24/2004	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	9/10/2004	<5.0	<5.0	**3,400**	13.0	<5.0	**270**
	11/10/2005	<5.0	<5.0	**3,900**	19.0	<5.0	**140**
	9/5/2006	<50.0	<50	**2,500**	<50	<5.0	**170**
	2/22/2007	<50.0	<50	**3,970**	<50	<5.0	**359**
	6/2/2008	<5.0	<5.0	**1,360**	19.9	<5.0	**207**
	6/15/2009	<5.0	<5.0	**1,110**	14.5	<5.0	**242**
	4/20/2010	<5.0	<5.0	**943**	<5.0	<5.0	**204**
	4/29/2011	<5.0	<5.0	**659**	<5.0	<5.0	**166**
	4/23/2012	<5.0	<5.0	**228**	<5.0	<5.0	**126**
MMW-6D	9/10/2004	<5.0	<5.0	**540**	<5.0	<5.0	**400**
	11/10/2005	<5.0	<5.0	**750**	<5.0	<5.0	**700**
	9/5/2006	<5.0	<5.0	**300**	<5.0	<5.0	**440**
	2/21/2007	<5.0	<5.0	**171**	<5.0	<5.0	**282**
	6/2/2008	<5.0	<5.0	65.5	<5.0	<5.0	**242**
	6/15/2009	<5.0	<5.0	8.6	<5.0	<5.0	**111**
	4/20/2010	<5.0	<5.0	8.2	<5.0	<5.0	**63.6**
	4/29/2011	<5.0	<5.0	<5.0	<5.0	<5.0	**51.1**
	2/14/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**43.9**
	4/23/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**38.5**
	7/31/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**38.1**
	11/13/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**57.5**
	3/5/2013	<5.0	<5.0	<5.0	<5.0	<5.0	**61.1**
MMW-11D	6/16/2009	<5.0	<5.0	**25.3**	6.7	<5.0	<2.0
	8/5/2009	<5.0	<5.0	**485**	22.6	<5.0	**15.3**
	11/2/2009	<5.0	<5.0	**771**	31.8	<5.0	**18.8**
	2/3/2010	<5.0	<5.0	**301**	28.2	<5.0	**5.2**
	4/22/2010	<5.0	<5.0	**307**	21.8	<5.0	**2.6**
	7/21/2010	<5.0	<5.0	**396**	21.8	<5.0	**10.9**
	10/12/2010	<5.0	<5.0	**162**	<5.0	<5.0	<2.0
	1/19/2011	<5.0	<5.0	**570**	26.7	<5.0	**5.9**
	4/30/2011	<5.0	<5.0	**356**	17.2	<5.0	**3.6**
	7/26/2011	<5.0	<5.0	**304**	18.3	<5.0	**3.6**
	10/21/2011	<5.0	<5.0	**751**	22.7	<5.0	**11.8**
	2/14/2012	<5.0	<5.0	**240**	19.0	<5.0	<2.0
	4/24/2012	<5.0	<5.0	**186**	13.0	<5.0	<2.0
	7/31/2012	<5.0	<5.0	**310**	20.3	<5.0	**3.2**
	11/13/2012	<5.0	<5.0	**309**	14.6	<5.0	**2.9**
	3/4/2013	<5.0	<5.0	**221**	18.9	<5.0	<2.0

Table 3
Cumulative Monitoring Well Groundwater Analytical Results
Quarter 1 - 2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

Well ID	Sample Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Chloroform	Vinyl chloride
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
IDEM RISC Industrial Default Cleanup Level - 2006		55	31	1,000	2,000	1,000	4
IDEM RISC Residential Default Cleanup Level - 2006		5	5	70	100	80	2
MMW-13D	8/5/2009	<5.0	<5.0	672	<5.0	<5.0	59.2
	11/2/2009	<5.0	<5.0	949	<5.0	<5.0	182
	2/3/2010	<5.0	<5.0	819	6.2	<5.0	260
	4/22/2010	<5.0	<5.0	469	<5.0	<5.0	4.6
	7/21/2010	<5.0	<5.0	432	<5.0	<5.0	16.6
	10/12/2010	<5.0	<5.0	1,200	<5.0	<5.0	187
	1/19/2011	<5.0	<5.0	920	12.3	<5.0	179
	4/30/2011	<5.0	<5.0	527	<5.0	<5.0	15.4
	7/26/2011	<5.0	<5.0	328	<5.0	<5.0	11.9
	10/18/2011	<5.0	<5.0	771	5.2	<5.0	140
	2/14/2012	<5.0	<5.0	331	<5.0	<5.0	9.9
	4/24/2012	<5.0	<5.0	422	<5.0	<5.0	46.7
	7/31/2012	<5.0	<5.0	684	<5.0	<5.0	147
	11/13/2012	<5.0	<5.0	765	<5.0	<5.0	135
	3/4/2013	<5.0	<5.0	374	<5.0	<5.0	21.7
MMW-13D Low	6/16/2009	<5.0	<5.0	613	10.4	<5.0	17.3
MMW-13D Medium (29')	6/16/2009	<5.0	<5.0	578	12.1	<5.0	14.9
MMW-13D High (17')	6/16/2009	<5.0	<5.0	597	9.7	<5.0	21.1
MMW-14D	6/16/2009	<5.0	<5.0	648	15.6	<5.0	57.6
	8/5/2009	<5.0	<5.0	589	10.9	<5.0	79.1
	11/2/2009	<5.0	<5.0	541	9.2	<5.0	83.8
	2/3/2010	<5.0	<5.0	871	13.9	<5.0	84.9
	4/20/2010	<5.0	<5.0	763	14.1	<5.0	72.8
	7/21/2010	<5.0	<5.0	805	14.6	<5.0	60.8
	10/12/2010	<5.0	<5.0	775	8.4	<5.0	83.3
	1/18/2011	<5.0	<5.0	785	24.0	<5.0	109
	4/30/2011	<5.0	<5.0	1,070	14.7	<5.0	68.3
	7/26/2011	<5.0	<5.0	875	15.3	<5.0	81.0
	10/19/2011	<5.0	<5.0	898	11.1	<5.0	92.6
	2/14/2012	<5.0	<5.0	1080	17.4	<5.0	89.7
	4/23/2012	<5.0	<5.0	996	11.0	<5.0	79.6
	7/31/2012	<5.0	<5.0	795	13.5	<5.0	95.1
	11/13/2012	<5.0	<5.0	1010	10.0	<5.0	105
	3/4/2013	<5.0	<5.0	983	16.2	<5.0	96.4
MMW-15D	2/15/2012	<5.0	<5.0	7.3	<5.0	<5.0	<2.0
	4/26/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	8/6/2012	<5.0	<5.0	11.6	<5.0	<5.0	3.1
	11/21/2012	<5.0	<5.0	10.6	<5.0	<5.0	<2.0
	3/6/2013	<5.0	<5.0	10	<5.0	<5.0	2.7

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Quarter 1 - 2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

Well ID	Sample Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Chloroform	Vinyl chloride
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
IDEM RISC Industrial Default Cleanup Level - 2006		55	31	1,000	2,000	1,000	4
IDEM RISC Residential Default Cleanup Level - 2006		5	5	70	100	80	2
Monitoring Wells (Plaza)							
Shallow Wells							
MMW-P-01	11/9/2005	33	210	160	9.6	<5.0	76.0
	2/22/2007	85.2	356	274	16.7	<5.0	28.7
	6/14/2007	111	368	350	10.0	<5.0	79.6
	9/20/2007	206	322	300	11.5	<5.0	127
	12/14/2007	230	320	240	7.1	<5.0	87.0
	3/21/2008	120	170	3,100	25.0	<5.0	42.0
	6/5/2008	22.0	31.5	3,660	68.6	<5.0	123
	9/11/2008	14.2	15.1	1,690	<5.0	<5.0	87.7
	11/19/2008	<5.0	<5.0	4,320	<5.0	<5.0	116
	3/17/2009	17.5	22.6	12,300	143	<5.0	3,290
	6/17/2009	<50.0	<50.0	4,020	63.9	<50.0	1,840
	8/6/2009	97.4	<50.0	12,200	<50.0	<50.0	3,730
	11/3/2009	103	58.3	9,330	<50.0	<50.0	4,770
	2/4/2010	104	60.6	9,190	130	<50.0	13,600
	4/22/2010	90.5	79.0	9,400	94.7	<50.0	12,600
	7/7/2010	<50.0	<50.0	1,880	<50.0	<50.0	2,960
	10/14/2010	<125	<125	4,760	<125	<125	5,440
	1/20/2011	153	140	1,960	<50.0	<50.0	11,100
	5/5/2011	8.4	26.8	281	<5.0	<5.0	232
	7/28/2011	5.7	6.0	734	<5.0	<5.0	1,070
	10/24/2011	23.4	10.0	839	9.10	<5.0	1,410
	2/13/2012	15.0	<5.0	438	<5.0	<5.0	2,270
	4/25/2012	21.8	11.0	459	8.1	<5.0	1,720
	8/2/2012	12.0	8.0	377	<5.0	<5.0	1,680
	11/14/2012	24.5	13.1	619	14.1	<5.0	3,060
	3/4/2013	24.4	12.4	527	12.9	<5.0	2,810
MMW-P-02	11/8/2005	24.0	<5.0	87.0	7.3	<5.0	49.0
	2/22/2007	184	<5.0	39.4	<5.0	<5.0	27.4
	6/14/2007	17.1	<5.0	35.0	<5.0	<5.0	27.5
	9/19/2007	13.3	<5.0	66.3	5.6	<5.0	50.1
	12/13/2007	7.8	<5.0	69.0	<5.0	<5.0	53.0
	3/20/2008	19.0	<5.0	67.0	<5.0	<5.0	42.0
	6/5/2008	94.9	<5.0	44.0	<5.0	<5.0	46.4
	9/11/2008	17.5	<5.0	46.6	<5.0	<5.0	42.0
	11/19/2008	10.7	<5.0	75.4	<5.0	<5.0	69.5
	3/17/2009	23.4	<5.0	65.4	5.3	<5.0	68.4
	6/17/2009	5.1	<5.0	54.2	9.2	<5.0	80.6
	8/6/2009	5.1	<5.0	55.8	<5.0	<5.0	56.2
	11/3/2009	11.1	<5.0	60.1	<5.0	<5.0	73.9
	2/4/2010	7.4	<5.0	75.8	5.8	<5.0	104
	4/22/2010	9.9	6.8	56.0	8.0	<5.0	110
	7/21/2010	24.0	<5.0	72.4	<5.0	<5.0	161
	10/13/2010	9.3	<5.0	61.0	<5.0	<5.0	95.0
	1/19/2011	15.9	<5.0	64.3	14.0	<5.0	396
	5/4/2011	9.2	<5.0	56.5	<5.0	<5.0	386
	7/27/2011	<5.0	<5.0	42.9	<5.0	<5.0	218
	10/19/2011	9.1	<5.0	36.9	<5.0	<5.0	304
	2/13/2012	<5.0	<5.0	120.0	<5.0	<5.0	479
	4/25/2012	<5.0	<5.0	53.4	<5.0	<5.0	274
	8/1/2012	6.4	<5.0	34.2	<5.0	<5.0	257
	11/14/2012	6.7	<5.0	54.0	<5.0	<5.0	803
	3/4/2013	<5.0	<5.0	52.5	<5.0	<5.0	347

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Well ID	Sample Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Chloroform	Vinyl chloride
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
IDEM RISC Industrial Default Cleanup Level - 2006		**55**	**31**	**1,000**	**2,000**	**1,000**	**4**
IDEM RISC Residential Default Cleanup Level - 2006		**5**	**5**	**70**	**100**	**80**	**2**
MMW-P-03S	11/9/2005	**110**	<5.0	**97.0**	9.6	<5.0	<2.0
	2/22/2007	**397**	<5.0	**105**	10.0	<5.0	<2.0
	6/14/2007	**256**	<5.0	**96.4**	9.2	<5.0	**9.3**
	9/20/2007	**144**	<5.0	**131**	15.8	<5.0	**16.0**
	12/13/2007	**67.0**	<5.0	**88.0**	5.3	<5.0	**15.0**
	3/20/2008	**130**	<5.0	**84.0**	7.3	<5.0	**10.0**
	6/5/2008	**19.4**	<5.0	**380**	14.9	<5.0	**10.6**
	9/11/2008	<5.0	<5.0	<5.0	<5.0	<5.0	**72.6**
	11/19/2008	<5.0	**6.0**	**494**	<5.0	<5.0	**40.8**
	3/17/2009	**7.5**	<5.0	**904**	38.7	<5.0	**283**
	6/17/2009	<5.0	<5.0	**332**	22.3	<5.0	**759**
	8/6/2009	**30.6**	**8.2**	**573**	25.0	<5.0	**843**
	11/3/2009	<5.0	<5.0	**141**	16.1	<5.0	**379**
	2/4/2010	<5.0	<5.0	**155**	19.4	<5.0	**382**
	4/22/2010	**14.2**	**8.9**	**156**	13.4	<5.0	**377**
	7/21/2010	<5.0	<5.0	<5.0	<5.0	<5.0	**141**
	10/13/2010	<5.0	<5.0	**70.9**	9.2	<5.0	**542**
	1/19/2011	<5.0	<5.0	**79.7**	19.4	<5.0	**338**
	5/4/2011	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	7/27/2011	<5.0	<5.0	29.3	<5.0	<5.0	**245**
	10/19/2011	<5.0	<5.0	33.5	6.6	<5.0	**446**
	2/13/2012	<5.0	<5.0	48.0	<5.0	<5.0	**221**
	4/25/2012	<5.0	<5.0	18.4	<5.0	<5.0	**257**
	8/1/2012	<5.0	<5.0	16.1	<5.0	<5.0	**294**
	11/14/2012	<5.0	<5.0	12.3	<5.0	<5.0	**113**
	3/4/2013	<5.0	<5.0	49.4	<5.0	<5.0	**124**
MMW-P-04	11/9/2005	**180**	<5.0	<5.0	<5.0	<5.0	<2.0
	2/22/2007	**315**	<5.0	<5.0	<5.0	<5.0	<2.0
	6/14/2007	**268**	<5.0	<5.0	<5.0	<5.0	<2.0
	9/20/2007	**214**	<5.0	<5.0	<5.0	<5.0	<2.0
	12/13/2007	**62.0**	<5.0	<5.0	<5.0	<5.0	<2.0
	3/20/2008	**120**	<5.0	<5.0	<5.0	<5.0	<2.0
	6/6/2008	**154**	**6.0**	59.7	<5.0	<5.0	<2.0
	9/11/2008	**31.9**	<5.0	**360**	7.1	<5.0	<2.0
	11/19/2008	**45.0**	<5.0	**248**	<5.0	<5.0	<2.0
	3/18/2009	**19.4**	**5.4**	**304**	10.8	<5.0	<2.0
	6/17/2009	**35.3**	**5.4**	**827**	22.0	<5.0	**2.0**
	8/6/2009	<5.0	<5.0	15.1	<5.0	<5.0	<2.0
	11/5/2009	<5.0	<5.0	**1,190**	36.9	<5.0	**90.9**
	2/12/2010	<5.0	<5.0	**144**	8.3	<5.0	**224**
	4/21/2010	<5.0	<5.0	**268**	15.8	<5.0	**364**
	7/22/2010	<5.0	<5.0	**189**	12.9	<5.0	**402**
	10/13/2010	<5.0	<5.0	10.3	<5.0	<5.0	**16.8**
	2/18/2011	<5.0	<5.0	6.4	<5.0	<5.0	**36.3**
	5/5/2011	**144**	<5.0	**76.2**	<5.0	<5.0	**124**
	7/28/2011	<5.0	<5.0	30.6	<5.0	<5.0	**78.8**
	10/24/2011	<5.0	<5.0	14.8	<5.0	<5.0	**68.7**
	2/16/2012	<5.0	<5.0	6.9	<5.0	<5.0	**16.1**
	5/1/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**5.7**
	8/10/2012	<5.0	<5.0	5.8	<5.0	<5.0	**2.7**
	11/21/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	3/9/2013	**28.2**	<5.0	50.1	<5.0	<5.0	**6.1**

Table 3
Cumulative Monitoring Well Groundwater Analytical Results
Quarter 1 - 2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

Well ID	Sample Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Chloroform	Vinyl chloride
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
IDEM RISC Industrial Default Cleanup Level - 2006		**55**	**31**	**1,000**	**2,000**	**1,000**	**4**
IDEM RISC Residential Default Cleanup Level - 2006		**5**	**5**	**70**	**100**	**80**	**2**
MMW-P-05	11/8/2005	<5.0	<5.0	6.2	<5.0	<5.0	<2.0
	2/22/2007	**23.7**	<5.0	9.1	<5.0	<5.0	<2.0
	6/14/2007	<5.0	<5.0	18.8	<5.0	<5.0	<2.0
	9/19/2007	<5.0	<5.0	18.8	<5.0	<5.0	<2.0
	12/14/2007	<5.0	<5.0	14.8	<5.0	<5.0	<2.0
	3/20/2008	<5.0	<5.0	8.1	<5.0	<5.0	<2.0
	6/5/2008	<5.0	<5.0	15.6	<5.0	<5.0	<2.0
	9/11/2008	<5.0	<5.0	16.7	<5.0	<5.0	<2.0
	11/19/2008	<5.0	<5.0	22.1	<5.0	<5.0	<2.0
	3/17/2009	<5.0	<5.0	13.7	<5.0	<5.0	<2.0
	6/17/2009	<5.0	<5.0	10.9	6.6	<5.0	<2.0
	8/6/2009	<5.0	<5.0	15.1	<5.0	<5.0	<2.0
	11/3/2009	<5.0	<5.0	7.6	<5.0	<5.0	**2.7**
	2/4/2010	<5.0	<5.0	6.8	<5.0	<5.0	<2.0
	4/22/2010	<5.0	<5.0	8.6	<5.0	<5.0	<2.0
	7/21/2010	<5.0	<5.0	10.4	<5.0	<5.0	**5.3**
	10/13/2010	<5.0	<5.0	13.6	<5.0	<5.0	**3.9**
	1/20/2011	<5.0	<5.0	14.1	<5.0	<5.0	<2.0
	4/30/2011	<5.0	<5.0	<5.0	<5.0	<5.0	**9.2**
	7/27/2011	<5.0	<5.0	10.3	<5.0	<5.0	**307**
	10/19/2011	<5.0	<5.0	8.3	<5.0	<5.0	**48.3**
	2/13/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**79.4**
	4/25/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**80.9**
	8/2/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**157**
	11/14/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**151**
	3/4/2013	<5.0	<5.0	<5.0	<5.0	<5.0	**173**
MMW-P-06	11/8/2005	<5.0	<5.0	**200**	24.0	<5.0	**21.0**
	2/22/2007	<5.0	<5.0	**158**	19.2	<5.0	<2.0
	6/14/2007	<5.0	<5.0	**214**	22.7	<5.0	**13.3**
	9/19/2007	<5.0	<5.0	**283**	38.2	<5.0	**26.1**
	12/14/2007	<5.0	<5.0	**260**	40.0	<5.0	**31.0**
	3/20/2008	<5.0	<5.0	**250**	31.0	<5.0	**26.0**
	6/5/2008	<5.0	<5.0	**265**	30.9	<5.0	**40.1**
	9/11/2008	<5.0	<5.0	**271**	33.3	<5.0	<2.0
	11/19/2008	<5.0	<5.0	**292**	<5.0	<5.0	**61.4**
	3/17/2009	<5.0	<5.0	**292**	35.3	<5.0	<2.0
	6/17/2009	<5.0	<5.0	**145**	22.2	<5.0	**90.6**
	8/6/2009	<5.0	<5.0	**136**	14.3	<5.0	**301**
	11/3/2009	<5.0	<5.0	**107**	15.2	<5.0	**292**
	2/4/2010	<5.0	<5.0	**79.1**	11.2	<5.0	**1,870**
	4/22/2010	<5.0	<5.0	23.7	8.0	<5.0	**2,470**
	7/21/2010	<50.0	<50.0	<50.0	<50.0	<50.0	**5,870**
	10/14/2010	<100	<100	<100	<100	<100	**12,900**
	1/20/2011	<100	<100	**2,700**	<100	<100	**15,000**
	5/4/2011	<50.0	<50.0	**2,850**	<50.0	<50.0	**14,400**
	7/28/2011	<50.0	<50.0	**1,670**	<50.0	<50.0	**15,600**
	10/24/2011	<50.0	<50.0	**10,100**	<50.0	<50.0	**11,300**
	2/13/2012	<50.0	<50.0	**2,800**	<50.0	<50.0	**10,100**
	4/26/2012	<5.0	<5.0	**3,220**	29.2	<5.0	**7,090**
	8/2/2012	<5.0	<5.0	**6,420**	47.0	<5.0	**6,510**
	11/14/2012	<5.0	<5.0	**4,640**	<5.0	<5.0	**6,170**
	3/4/2013	<50.0	<50.0	**2,230**	<50.0	<50.0	**5,010**

Table 3
Cumulative Monitoring Well Groundwater Analytical Results
Quarter 1 - 2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

Well ID	Sample Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Chloroform	Vinyl chloride
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
IDEM RISC Industrial Default Cleanup Level - 2006		55	31	1,000	2,000	1,000	4
IDEM RISC Residential Default Cleanup Level - 2006		5	5	70	100	80	2
MMW-P-07	2/22/2007	3,060	81.5	82.0	8.8	<5.0	<2.0
	6/14/2007	2,850	90.0	82.5	<50.0	<50.0	<20.0
	9/20/2007	5,200	109	121	16.1	<5.0	2.0
	12/13/2007	1,440	157	930	8.8	7.4	80.0
	3/21/2008	31.0	7.6	1,700	27.0	<5.0	110
	6/5/2008	<5.0	<5.0	938	15.6	<5.0	466
	9/11/2008	<5.0	<5.0	1,870	55.2	<5.0	1,620
	11/19/2008	<5.0	<5.0	797	<5.0	<5.0	749
	3/17/2009	<5.0	<5.0	361	17.7	<5.0	1,830
	6/17/2009	<5.0	<5.0	87.1	9.4	<5.0	1,130
	8/6/2009	<5.0	<5.0	48.7	<5.0	<5.0	787
	11/3/2009	<5.0	<5.0	809	14.1	<5.0	1,510
	2/4/2010	<5.0	<5.0	555	12.4	<5.0	1,880
	4/22/2010	<5.0	7.0	1,050	23.7	<5.0	2,080
	7/22/2010	<5.0	<5.0	247	7.8	<5.0	1,680
	10/14/2010	<25.0	<25.0	665	<25.0	<25.0	2,310
	1/20/2011	<5.0	<5.0	295	13.9	<5.0	562
	5/4/2011	<5.0	<5.0	72.0	<5.0	<5.0	2,170
	7/28/2011	<5.0	<5.0	73.6	<5.0	<5.0	978
	10/24/2011	<5.0	<5.0	37.3	<5.0	<5.0	388
	2/13/2012	<5.0	<5.0	<5.0	<5.0	<5.0	330
	4/25/2012	<5.0	<5.0	11.6	<5.0	<5.0	266
	8/2/2012	<5.0	<5.0	33.7	<5.0	<5.0	405
	11/14/2012	<5.0	<5.0	42.2	<5.0	<5.0	607
	3/4/2013	<5.0	<5.0	23.9	<5.0	<5.0	386
MMW-P-08	2/22/2007	6,280	281	240	26.7	<5.0	<2.0
	6/14/2007	6,440	310	169	<50.0	<50.0	<20.0
	9/20/2007	9,780	494	201	25.3	<5.0	6.5
	12/14/2007	390	210	5,800	<50.0	<50.0	<20.0
	3/21/2008	6.7	11.0	6,500	130	<5.0	55.0
	6/5/2008	<5.0	<5.0	<5.0	<5.0	<5.0	562
	9/11/2008	5.8	5.0	18,300	686	<50.0	4,740
	11/19/2008	<50.0	<50.0	5,690	91.4	<50.0	13,000
	3/17/2009	<5.0	<5.0	1,130	47.1	<5.0	5,680
	6/17/2009	<125	<125	356	145	<5.0	7,200
	8/6/2009	<125	<125	601	<50.0	<50.0	8,960
	11/3/2009	<50.0	<50.0	86.7	<50.0	<50.0	2,860
	2/4/2010	<50.0	<50.0	1,140	<50.0	<50.0	4,860
	4/22/2010	<5.0	<5.0	45.7	8.1	<5.0	2,180
	7/22/2010	<5.0	<5.0	97.8	<5.0	<5.0	1,320
	10/14/2010	<25.0	<25.0	39.5	<25.0	<25.0	676
	1/20/2011	<5.0	<5.0	590	14.8	<25.0	1,770
	5/4/2011	<5.0	<5.0	288	<5.0	<5.0	2,030
	7/27/2011	<5.0	<5.0	35.9	<5.0	<5.0	274
	10/24/2011	<5.0	<5.0	32.5	<5.0	<5.0	136
	2/13/2012	<5.0	<5.0	<5.0	<5.0	<5.0	52.5
	4/25/2012	<5.0	<5.0	5.0	<5.0	<5.0	85.2
	8/2/2012	<5.0	<5.0	879	13.9	<5.0	561
	11/14/2012	<5.0	<5.0	18.4	<5.0	<5.0	436
	3/4/2013	<5.0	<5.0	111	<5.0	<5.0	934

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Quarter 1 - 2013
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Well ID	Sample Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Chloroform	Vinyl chloride
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
IDEM RISC Industrial Default Cleanup Level - 2006		55	31	1,000	2,000	1,000	4
IDEM RISC Residential Default Cleanup Level - 2006		5	5	70	100	80	2
MMW-P-09S	2/22/2007	10.0	<5.0	<5.0	<5.0	<5.0	<2.0
	6/14/2007	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	9/19/2007	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	12/12/2007	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	3/20/2008	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	6/5/2008	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	9/11/2008	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	11/19/2008	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	3/17/2009	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	6/16/2009	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	8/6/2009	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	11/3/2009	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	2/3/2010	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/22/2010	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	7/22/2010	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	10/13/2010	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	1/19/2011	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/30/2011	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	7/26/2011	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	10/18/2011	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	2/15/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/24/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	8/1/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	11/13/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	3/5/2013	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
MMW-P-10S	6/14/2007	36.1	36.3	61.6	6.9	<5.0	<2.0
	7/6/2007	87.9	54.9	92.1	10.2	<5.0	<2.0
	9/19/2007	192	82.6	126	14.4	<5.0	<2.0
	12/14/2007	71.0	<5.0	<5.0	<5.0	<5.0	2.4
	3/20/2008	26.8	19.2	250	12.2	<5.0	<2.0
	6/5/2008	15.0	9.7	537	16.0	<5.0	114
	9/11/2008	74.8	36.5	1,650	74.0	<5.0	27.7
	11/19/2008	78.6	28.0	1,510	<5.0	<5.0	22.3
	3/17/2009	11.9	8.6	1,160	71.5	<5.0	<2.0
	6/17/2009	<5.0	<5.0	331	20.5	<5.0	63.9
	8/6/2009	<5.0	<5.0	158	16.1	<5.0	395
	11/3/2009	<5.0	<5.0	29.6	<5.0	<5.0	288
	2/4/2010	<5.0	<5.0	45.4	<5.0	<5.0	419
	4/22/2010	<5.0	<5.0	16.2	<5.0	<5.0	118
	7/21/2010	<5.0	<5.0	<5.0	<5.0	<5.0	16.5
	10/14/2010	<5.0	<5.0	5.4	<5.0	<5.0	381
	1/20/2011	<5.0	<5.0	11.7	<5.0	<5.0	27.8
	5/5/2011	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	7/27/2011	<5.0	<5.0	<5.0	<5.0	<5.0	12.5
	10/21/2011	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	2/13/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/25/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	8/2/2012	<5.0	<5.0	<5.0	<5.0	<5.0	26.8
	11/14/2012	<5.0	<5.0	<5.0	<5.0	<5.0	2.3
	2/28/2013	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
MMW-P-12S	9/9/2011	<5.0	<5.0	741	14.1	<5.0	50.8
	10/24/2011	<5.0	<5.0	642	19.2	<5.0	60.7
	2/15/2012	<5.0	<5.0	777	14.5	<5.0	61.4
	5/1/2012	<5.0	<5.0	454	12.4	<5.0	50.9
	8/7/2012	<5.0	<5.0	679	20.3	<5.0	51.8
	11/19/2012	<5.0	<5.0	763	15.8	<5.0	76.1
	3/9/2013	<5.0	<5.0	505	18.0	<5.0	63.0

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Well ID	Sample Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Chloroform	Vinyl chloride
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
IDEM RISC Industrial Default Cleanup Level - 2006		55	31	1,000	2,000	1,000	4
IDEM RISC Residential Default Cleanup Level - 2006		5	5	70	100	80	2
Deep Wells							
MMW-P-03D	11/9/2005	22.0	<5.0	42.0	<5.0	<5.0	2.0
	2/22/2007	48.9	<5.0	57.8	<5.0	39.0	15.6
	6/14/2007	21.7	<5.0	74.9	<5.0	<5.0	34.5
	9/19/2007	14.3	<5.0	76.1	7.3	<5.0	36.6
	12/13/2007	11.0	<5.0	40.0	<5.0	<5.0	20.0
	39527	<5.0	<5.0	170	6.0	<5.0	18.0
	39604	<5.0	<5.0	150	7.4	<5.0	26.0
	39702	<5.0	<5.0	95.7	6.4	<5.0	<2.0
	11/19/2008	<5.0	<5.0	80.6	<5.0	<5.0	36.9
	3/17/2009	<5.0	<5.0	65.2	<5.0	<5.0	69.8
	6/17/2009	<5.0	<5.0	14.9	5.9	<5.0	137
	8/6/2009	<5.0	<5.0	16.7	<5.0	<5.0	248
	11/3/2009	<5.0	<5.0	8.5	<5.0	<5.0	168
	2/4/2010	<5.0	<5.0	<5.0	<5.0	<5.0	287
	4/22/2010	<5.0	<5.0	7.2	<5.0	<5.0	211
	7/21/2010	6.6	<5.0	271	8.1	<5.0	305
	10/13/2010	<5.0	<5.0	<5.0	<5.0	<5.0	16.2
	1/19/2011	<5.0	<5.0	<5.0	<5.0	<5.0	46.2
	5/4/2011	<5.0	<5.0	64.3	<5.0	<5.0	118
	7/27/2011	<5.0	<5.0	<5.0	<5.0	<5.0	10.5
	10/18/2011	<5.0	<5.0	<5.0	<5.0	<5.0	61.5
	2/13/2012	<5.0	<5.0	<5.0	<5.0	<5.0	4.0
	4/25/2012	<5.0	<5.0	<5.0	<5.0	<5.0	16.6
	8/1/2012	<5.0	<5.0	<5.0	<5.0	<5.0	175
	11/14/2012	<5.0	<5.0	<5.0	<5.0	<5.0	17.3
	3/4/2013	<5.0	<5.0	<5.0	<5.0	<5.0	51.7
MMW-P-09D	6/14/2007	<5.0	<5.0	<5.0	<5.0	<5.0	46.2
	9/19/2007	<5.0	<5.0	<5.0	<5.0	<5.0	83.1
	12/12/2007	<5.0	<5.0	<5.0	<5.0	<5.0	71.0
	3/20/2008	<5.0	<5.0	<5.0	<5.0	<5.0	3.0
	6/5/2008	<5.0	<5.0	<5.0	<5.0	<5.0	100
	9/11/2008	<5.0	<5.0	<5.0	<5.0	<5.0	72.6
	11/19/2008	<5.0	<5.0	<5.0	<5.0	<5.0	97.2
	3/17/2009	<5.0	<5.0	<5.0	<5.0	<5.0	85.1
	6/16/2009	<5.0	<5.0	<5.0	<5.0	<5.0	73.5
	8/6/2009	<5.0	<5.0	<5.0	<5.0	<5.0	80.8
	11/3/2009	<5.0	<5.0	<5.0	<5.0	<5.0	87.1
	2/3/2010	<5.0	<5.0	<5.0	<5.0	<5.0	111
	4/22/2010	<5.0	<5.0	<5.0	<5.0	<5.0	76.9
	7/22/2010	<5.0	<5.0	<5.0	<5.0	<5.0	81.2
	10/13/2010	<5.0	<5.0	<5.0	<5.0	<5.0	70.6
	1/19/2011	<5.0	<5.0	<5.0	<5.0	<5.0	66.9
	4/30/2011	<5.0	<5.0	<5.0	<5.0	<5.0	74.5
	7/26/2011	<5.0	<5.0	<5.0	<5.0	<5.0	83.3
	10/21/2011	<5.0	<5.0	<5.0	<5.0	<5.0	71.9
	2/15/2012	<5.0	<5.0	<5.0	<5.0	<5.0	70.7
	4/24/2012	<5.0	<5.0	<5.0	<5.0	<5.0	56.6
	8/1/2012	<5.0	<5.0	<5.0	<5.0	<5.0	69.2
	11/13/2012	<5.0	<5.0	<5.0	<5.0	<5.0	61.6
	3/5/2013	<5.0	<5.0	<5.0	<5.0	<5.0	96.4

Table 3
Cumulative Monitoring Well Groundwater Analytical Results
Quarter 1 - 2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

Well ID	Sample Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Chloroform	Vinyl chloride
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
IDEM RISC Industrial Default Cleanup Level - 2006		55	31	1,000	2,000	1,000	4
IDEM RISC Residential Default Cleanup Level - 2006		5	5	70	100	80	2
MMW-P-10D	6/14/2007	<5.0	10.6	481	7.7	<5.0	98.7
	7/6/2007	<5.0	<5.0	498	9.0	<5.0	118
	9/19/2007	<5.0	<5.0	350	<5.0	<5.0	76.1
	12/14/2007	<5.0	<5.0	270	<5.0	<5.0	77.0
	3/20/2008	<5.0	<5.0	<5.0	<5.0	<5.0	3.0
	6/5/2008	<5.0	<5.0	508	<5.0	<5.0	267
	9/11/2008	<5.0	<5.0	435	<5.0	<5.0	288
	11/19/2008	<5.0	<5.0	3,390	<5.0	<5.0	5,030
	3/17/2009	<5.0	<5.0	4,860	12.9	<5.0	2,500
	6/17/2009	<5.0	<5.0	3,710	9.6	<5.0	9,070
	8/6/2009	<5.0	<5.0	2,520	5.1	<5.0	3,400
	11/3/2009	<5.0	<5.0	2,740	<5.0	<5.0	3,500
	2/4/2010	<5.0	<5.0	406	<5.0	<5.0	2,130
	4/22/2010	<5.0	<5.0	30.5	<5.0	<5.0	364
	7/22/2010	<5.0	<5.0	120	<5.0	<5.0	865
	10/14/2010	<25.0	<25.0	<25.0	<25.0	<25.0	707
	1/20/2011	<5.0	<5.0	21.4	<5.0	<5.0	1,210
	5/5/2011	<5.0	<5.0	8.1	<5.0	<5.0	272
	7/27/2011	<5.0	<5.0	46.5	<5.0	<5.0	825
	10/21/2011	<5.0	<5.0	<5.0	<5.0	<5.0	444
	2/13/2012	<5.0	<5.0	28.7	<5.0	<5.0	1790
	4/25/2012	<5.0	<5.0	<5.0	<5.0	<5.0	289
	8/2/2012	<5.0	<5.0	<5.0	<5.0	<5.0	475
	11/14/2012	<5.0	<5.0	<5.0	<5.0	<5.0	964
	2/28/2013	<5.0	<5.0	8.9	<5.0	<5.0	181
MMW-P-12D	9/9/2011	<5.0	<5.0	678	15.9	<5.0	63.0
	10/24/2011	<5.0	<5.0	644	14.2	<5.0	71.3
	2/15/2012	<5.0	<5.0	727	15.0	<5.0	65.1
	5/1/2012	<5.0	<5.0	591	15.2	<5.0	69.4
	8/7/2012	<5.0	<5.0	750	18.8	<5.0	67.6
	11/20/2012	<5.0	<5.0	793	17.4	<5.0	91.8
	3/9/2013	<5.0	<5.0	619	20.6	<5.0	71.4
ENVIRON Monitoring Wells (Off-site)							
Shallow Wells							
MW-167S	11/7/2005	<5.0	<5.0	<5.0	<5.0	<5.0	14.0
	2/21/2007	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	6/5/2008	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	6/17/2009	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/21/2010	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/29/2011	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	5/2/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	3/8/2013	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
MW-168S	11/7/2005	280	16.0	53.0	<5.0	<5.0	3.0
	2/21/2007	30.1	8.8	155	<5.0	<5.0	29.6
	6/14/2007	<5.0	<5.0	40.8	<5.0	<5.0	34.0
	9/19/2007	32.6	8.0	82.4	<5.0	<5.0	3.5
	12/13/2007	52.0	14.0	78.0	<5.0	<5.0	4.1
	3/20/2008	92.0	12.0	46.0	<5.0	<5.0	4.2
	6/5/2008	80.4	10.1	41.1	<5.0	<5.0	3.6
	9/11/2008	68.5	10.8	66.9	<5.0	<5.0	5.5
	8/7/2009	62.6	10.2	118	<5.0	NS	9.9
	4/21/2010	14.0	7.0	21.9	<5.0	<5.0	<2.0
	3/8/2013	76.0	11.7	75.7	<5.0	<5.0	57.1
MW-169S	2/21/2007	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	11/7/2005	<5.0	<5.0	<5.0	<5.0	NA	<2.0
	6/5/2008	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/21/2010	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/29/2011	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0

Table 3
Cumulative Monitoring Well Groundwater Analytical Results
Quarter 1 - 2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

Well ID	Sample Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Chloroform	Vinyl chloride
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
IDEM RISC Industrial Default Cleanup Level - 2006		**55**	**31**	**1,000**	**2,000**	**1,000**	**4**
IDEM RISC Residential Default Cleanup Level - 2006		**5**	**5**	**70**	**100**	**80**	**2**
MW-170S	2/21/2007	<5.0	<5.0	<5.0	<5.0	<5.0	**21.2**
	6/3/2008	<5.0	<5.0	<5.0	<5.0	<5.0	**5.5**
	6/17/2009	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/21/2010	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/29/2011	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	2/16/2012	<5.0	<5.0	6.3	<5.0	<5.0	<2.0
	5/2/2012	<5.0	<5.0	6.0	<5.0	<5.0	<2.0
	8/3/2012	<5.0	<5.0	7.9	<5.0	<5.0	<2.0
	11/16/2012	<5.0	<5.0	6.1	<5.0	<5.0	<2.0
	3/8/2013	<5.0	<5.0	7.9	<5.0	<5.0	<2.0
MW-171S	2/21/2007	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	6/3/2008	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/21/2010	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/29/2011	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	5/2/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
Deep Wells							
MW-165D	7/7/2010	<5.0	<5.0	**122**	<5.0	<5.0	**202**
MW-167D	11/7/2005	<5.0	<5.0	**750**	<5.0	<5.0	**110**
	2/21/2007	<5.0	<5.0	**375**	10.0	<5.0	**59.3**
	6/5/2008	<5.0	<5.0	**616**	28.0	<5.0	**43.8**
	6/17/2009	<5.0	<5.0	**612**	22.1	<5.0	**23.8**
	4/21/2010	<5.0	<5.0	**626**	22.1	<5.0	**25.6**
	4/29/2011	<5.0	<5.0	**392**	18.9	<5.0	**14.9**
	2/16/2012	<5.0	<5.0	**541**	<5.0	<5.0	**20.0**
	5/2/2012	<5.0	<5.0	**377**	16.9	<5.0	**21.7**
	8/3/2012	<5.0	<5.0	**422**	26.4	<5.0	**8.4**
	11/16/2012	<5.0	<5.0	**480**	19.9	<5.0	**9.2**
	3/8/2013	<5.0	<5.0	**382**	19.1	<5.0	**13.5**
MW-168D	11/7/2005	<5.0	<5.0	6.8	<5.0	<5.0	**49.0**
	2/21/2007	<5.0	<5.0	8.4	<5.0	<5.0	**58.1**
	6/14/2007	<5.0	<5.0	5.2	<5.0	<5.0	**47.5**
	9/19/2007	<5.0	<5.0	<5.0	<5.0	<5.0	**89.7**
	12/12/2007	<5.0	<5.0	<5.0	<5.0	<5.0	**74.0**
	3/20/2008	<5.0	<5.0	8.0	<5.0	<5.0	**39.0**
	6/5/2008	<5.0	<5.0	13.4	<5.0	<5.0	**65.9**
	9/11/2008	<5.0	<5.0	5.5	<5.0	<5.0	<2.0
	3/17/2009	<5.0	<5.0	16.5	<5.0	<5.0	<2.0
	6/18/2009	<5.0	<5.0	<5.0	<5.0	<5.0	**14.5**
	8/7/2009	<5.0	<5.0	<5.0	<5.0	<5.0	**36.2**
	11/4/2009	<5.0	<5.0	<5.0	<5.0	<5.0	**99.1**
	2/4/2010	<5.0	<5.0	6.3	<5.0	<5.0	**128**
	4/21/2010	<5.0	<5.0	13.2	<5.0	<5.0	**134**
	7/22/2010	<5.0	<5.0	6.0	<5.0	<5.0	**122**
	10/13/2010	<5.0	<5.0	<5.0	<5.0	<5.0	**134**
	4/29/2011	<5.0	<5.0	<5.0	10.0	<5.0	**96.4**
	7/28/2011	<5.0	<5.0	<5.0	<5.0	<5.0	**228**
	10/24/2011	<5.0	<5.0	8.9	<5.0	<5.0	**137**
	2/16/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**108**
	5/2/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**130**
	8/3/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**104**
	11/16/2012	<5.0	<5.0	6.9	<5.0	<5.0	**81.3**
	3/8/2013	<5.0	<5.0	<5.0	<5.0	<5.0	**80.5**
MW-169D	2/21/2007	<5.0	<5.0	<5.0	<5.0	<5.0	**11.9**
	11/7/2005	<5.0	<5.0	<5.0	<5.0	NA	**5.1**
	6/5/2008	<5.0	<5.0	<5.0	<5.0	<5.0	**14.3**
	4/21/2010	<5.0	<5.0	<5.0	<5.0	<5.0	**6.1**
	4/29/2011	<5.0	<5.0	<5.0	<5.0	<5.0	**9.1**
	5/2/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**27.1**

Table 3
Cumulative Monitoring Well Groundwater Analytical Results
Quarter 1 - 2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

Well ID	Sample Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Chloroform	Vinyl chloride
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
IDEM RISC Industrial Default Cleanup Level - 2006		**55**	**31**	**1,000**	**2,000**	**1,000**	**4**
IDEM RISC Residential Default Cleanup Level - 2006		**5**	**5**	**70**	**100**	**80**	**2**
MW-170D	2/21/2007	<5.0	<5.0	<5.0	<5.0	<5.0	**105**
	6/3/2008	<5.0	<5.0	<5.0	<5.0	<5.0	**230**
	6/17/2009	<5.0	<5.0	<5.0	<5.0	<5.0	**174**
	4/21/2010	<5.0	<5.0	<5.0	<5.0	<5.0	**161**
	7/7/2010	<5.0	<5.0	<5.0	<5.0	<5.0	**233**
	4/29/2011	<5.0	<5.0	<5.0	<5.0	<5.0	**100**
	2/16/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**88.8**
	5/2/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**91.0**
	8/3/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**77.2**
	11/16/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**62.8**
	3/8/2013	<5.0	<5.0	<5.0	<5.0	<5.0	**76.9**
MW-171D	2/21/2007	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	6/3/2008	<5.0	<5.0	<5.0	<5.0	<5.0	**3.0**
	6/16/2009	<5.0	<5.0	<5.0	<5.0	<5.0	**2.2**
	4/21/2010	<5.0	<5.0	<5.0	<5.0	<5.0	**6.3**
	7/22/2010	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/29/2011	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	5/2/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**9.5**
Floral Park Cemetery Wells (Off-site)							
Shallow Wells							
MMW-C-01	11/20/2008	**15.7**	**8.3**	**296**	<5.0	<5.0	<2.0
	3/17/2009	<5.0	<5.0	**508**	7.3	<5.0	<2.0
	6/18/2009	**23.2**	<5.0	<5.0	<5.0	<5.0	<2.0
	8/6/2009	**84.8**	<5.0	66.9	<5.0	<5.0	**35.2**
	11/3/2009	**12.6**	<5.0	**211**	8.9	<5.0	**2,720**
	2/3/2010	<5.0	<5.0	**176**	10.1	<5.0	**1,790**
	4/21/2010	**15.3**	<5.0	**165**	7.1	<5.0	**1,660**
	7/22/2010	**40.9**	<5.0	22.4	<5.0	<5.0	**8.1**
	10/14/2010	<5.0	<5.0	69.1	<5.0	<5.0	**1,100**
	1/19/2011	<5.0	<5.0	14.7	<5.0	<5.0	**215**
	5/5/2011	**22.2**	<5.0	<5.0	<5.0	<5.0	<2.0
	7/27/2011	**36.7**	<5.0	17.1	<5.0	<5.0	**150**
	10/21/2011	**18.7**	<5.0	20.6	<5.0	<5.0	**59**
	2/15/2012	**23.8**	<5.0	6.0	<5.0	<5.0	**21**
	4/24/2012	**11.9**	<5.0	10.6	<5.0	<5.0	**45.3**
	8/1/2012	<5.0	<5.0	8.9	<5.0	<5.0	**29.2**
	11/15/2012	**24.6**	<5.0	10.9	<5.0	<5.0	**26.7**
	3/5/2013	**17.5**	<5.0	<5.0	<5.0	<5.0	**10.1**
MMW-C-02S	11/20/2008	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	3/17/2009	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	6/18/2009	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	8/6/2009	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	11/3/2009	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	2/3/2010	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/21/2010	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	7/22/2010	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	10/13/2010	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	1/19/2011	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/30/2011	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	7/27/2011	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	10/18/2011	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	2/15/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/24/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	8/1/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	11/13/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	3/5/2013	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
MMW-C-16S	8/6/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	11/19/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	3/6/2013	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0

Table 3
Cumulative Monitoring Well Groundwater Analytical Results
Quarter 1 - 2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

Well ID	Sample Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Chloroform	Vinyl chloride
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
IDEM RISC Industrial Default Cleanup Level - 2006		**55**	**31**	**1,000**	**2,000**	**1,000**	**4**
IDEM RISC Residential Default Cleanup Level - 2006		**5**	**5**	**70**	**100**	**80**	**2**
MMW-P-11S	9/9/2011	**76.1**	<5.0	5.9	<5.0	<5.0	**9.1**
	10/24/2011	**592**	<5.0	<5.0	<5.0	<5.0	**2.5**
	2/15/2012	**658**	<5.0	<5.0	<5.0	<5.0	**2.3**
	5/1/2012	**351**	<5.0	9.1	<5.0	<5.0	**8.5**
	8/8/2012	**88.1**	<5.0	14.7	<5.0	<5.0	**11.4**
	11/15/2012	**538**	<5.0	6.5	<5.0	<5.0	**18.7**
	3/6/2013	**703**	<5.0	<5.0	<5.0	<5.0	**18.8**
MMW-P-13S	9/9/2011	<5.0	<5.0	<5.0	<5.0	<5.0	**8.3**
	10/24/2011	<5.0	<5.0	<5.0	<5.0	<5.0	**19.8**
	2/16/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/26/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	8/7/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**8.9**
	11/19/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**3.6**
	3/7/2013	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
MMW-P-14S	2/16/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	4/26/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	8/7/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	3/7/2013	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
Deep Wells							
MMW-C-02D	2/15/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**30.7**
	4/26/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**55.1**
	8/8/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**95.1**
	11/19/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**125**
	3/7/2013	<5.0	<5.0	<5.0	<5.0	<5.0	**162**
MMW-C-16D	8/6/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**224**
	11/19/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**349**
	3/6/2013	<5.0	<5.0	<5.0	<5.0	<5.0	**316**
MMW-C-17D	8/8/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**2.7**
	11/20/2012	<5.0	<5.0	<5.0	<5.0	<5.0	<2.0
	3/7/2013	<5.0	<5.0	<5.0	<5.0	<5.0	**2.1**
MMW-P-11DR	2/15/2012	<5.0	<5.0	8.4	<5.0	<5.0	**95.1**
	5/1/2012	<5.0	<5.0	8.5	<5.0	<5.0	**102**
	8/7/2012	<5.0	<5.0	11.7	<5.0	<5.0	**102**
	11/15/2012	<5.0	<5.0	10.4	<5.0	<5.0	**117**
	3/6/2013	<5.0	<5.0	10.6	<5.0	<5.0	**201**
MMW-P-13D	9/9/2011	<5.0	<5.0	<5.0	<5.0	<5.0	**139**
	10/24/2011	<5.0	<5.0	<5.0	<5.0	<5.0	**116**
	2/16/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**155**
	4/26/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**132**
	8/7/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**167**
	11/19/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**154**
	3/7/2013	<5.0	<5.0	<5.0	<5.0	<5.0	**140**
MMW-P-14D	2/16/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**49.6**
	4/26/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**49.5**
	8/7/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**58.1**
	11/20/2012	<5.0	<5.0	<5.0	<5.0	<5.0	**58.3**
	3/7/2013	<5.0	<5.0	<5.0	<5.0	<5.0	**32.3**

Notes:

All Values Over IDEM RISC Default Industrial Cleanup Level in **RED**.

All Values Over IDEM RISC Default Residential Cleanup Level in **BLUE**.

PCE = Tetrachloroethene; TCE = Trichloroethene; cis-1,2-DCE = cis-1,2-Dichloroethene; trans-1,2-DCE = trans-1,2-Dichloroethene.

Green Shading indicates areas that appear to be undergoing reductive dechlorination due to CAP-18 Injections.

"J" desgination indicates concentration was estimated due to high concentration of one parameter requiring dilution on other parameter quantitations.

All analytical results presented in micrograms per liter (ug/L).

ATTACHMENT 2

March-April 2013 Hydrologic Testing Results

Michigan Plaza Slug Testing Results
March-April 2013

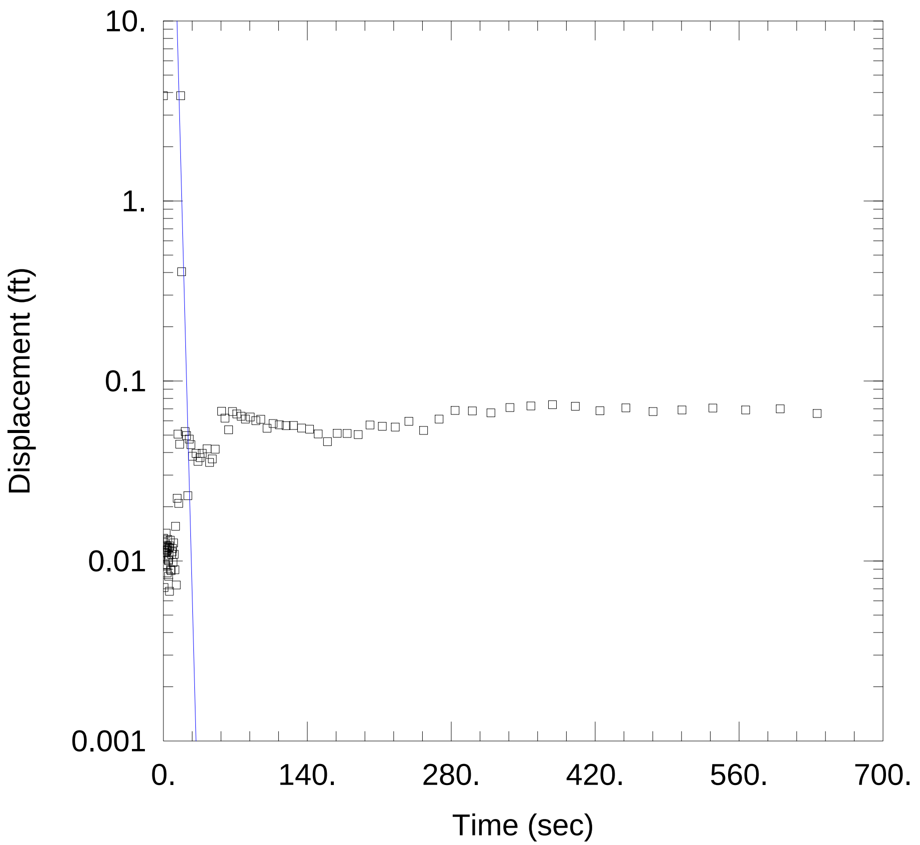
Methodology

On March 29 and April 1, 2013, MUNDELL personnel performed aquifer characterization studies by conducting a series of slug tests at selected wells located between Michigan Plaza and the Cossell Road residences. Monitoring well MMW-P-02 along with shallow/deep well pairs MMW-P-11S/DR, MMW-P-13S/D, and MMW-P-14S/D were evaluated. At each well, the well was opened and allowed to equilibrate for a period of 20 minutes. An In-Situ Inc. Level TROLL® 700 pressure transducer that records elapsed time and water level elevation was then placed into the well and the water level was then allowed to re-equilibrate. The TROLL® was connected to a hand-held In-Situ Inc. RuggedReader® Handheld PC device that controls test initiation and allowed monitoring of water level response data. Slug tests were set up to record response of water level displacement on a logarithmic time scale at intervals of about 3 readings per second at the start of the test, with progressively longer intervals based on a logarithmically decaying schedule as the test progresses. To begin each test, an inert solid PVC slug with dimensions of approximately 3 feet long by 1.25 inches in diameter (for an equivalent displacement volume of about 0.0255 ft^3) was rapidly lowered into the well to displace the water column. Measurements of the falling water level over time (falling head test) were recorded until approximately 95% recovery was attained. The test was stopped and a new test was begun when water levels returned to the approximate original static position. The test was repeated by removing the slug and recording "rising head" data over time. Between each monitoring well slug test, the Level TROLL® and water level meter were properly decontaminated.

Analyses of Field Data

Hydraulic conductivity values were calculated for each test by processing rising and falling water level data using the AQTESOLV™ software, created by HydroSOLVE, Inc. The Bouwer and Rice Method (1976) curve matching solution for partially penetrating wells was utilized. Based on the tests, K-values range between 22.1 and 141.1 ft/day, with an overall average K-value of 70.1 ft/day.

A summary of the testing results is provided in **Table 1** of the main report, with the slug test results included within this attachment.



WELL TEST ANALYSIS

Data Set: T:\...\MMW-P-02 IN (B-R 1976).aqt
Date: 04/10/13 Time: 16:32:12

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Well: MMW-P-02
Test Date: 3-29-2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 33.49 ft/day
y0 = 7335.5 ft

AQUIFER DATA

Saturated Thickness: 20.13 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MMW-P-02)

Initial Displacement: 3.84 ft
Total Well Penetration Depth: 10.63 ft
Casing Radius: 0.083 ft
Static Water Column Height: 20.13 ft
Screen Length: 10. ft
Well Radius: 0.33 ft

Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\Bouwer-Rice 1976\MMW-P-02 IN (B-R 1976).aqt
Date: 04/10/13
Time: 16:32:28

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Date: 3-29-2013
Test Well: MMW-P-02

AQUIFER DATA

Saturated Thickness: 20.13 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-02

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 3.84 ft
Static Water Column Height: 20.13 ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.33 ft
Screen Length: 10. ft
Total Well Penetration Depth: 10.63 ft

No. of Observations: 105

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.25	0.01337	11.94	0.01559	90.	0.06011
0.5	0.01158	12.66	0.007344	94.8	0.06131
0.75	0.007117	13.44	0.0223	100.8	0.05458
1.	0.01265	14.22	0.05062	106.8	0.05795
1.25	0.01121	15.06	0.02085	112.8	0.05698
1.5	0.01108	15.96	0.04448	119.4	0.05638
1.75	0.01168	16.92	3.84	126.6	0.05651
2.	0.00955	17.88	0.4042	134.4	0.0547
2.25	0.01108	18.96	-0.1717	142.2	0.05396
2.5	0.009312	20.1	-0.07645	150.6	0.05073
2.75	0.01426	21.3	0.05232	159.6	0.04602
3.	0.0122	22.56	0.04968	169.2	0.0512
3.25	0.01136	23.88	0.02303	178.8	0.05108

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.5	0.01197	25.32	0.0475	189.6	0.05035
3.75	0.008592	26.82	0.04421	201.	0.05687
4.	0.01149	28.38	0.03816	213.	0.05602
4.25	0.01318	30.06	-0.02969	225.6	0.05542
4.5	0.01183	31.86	0.0395	238.8	0.05965
4.75	0.01016	33.72	0.03577	253.2	0.05312
5.	0.01002	35.76	0.03745	268.2	0.06143
5.251	0.008222	37.86	0.03962	283.8	0.06856
5.501	0.01076	40.08	-0.008469	300.6	0.06807
5.751	0.01183	42.48	0.04192	318.6	0.0665
6.001	0.006787	45.	0.03528	337.2	0.07116
6.36	0.0121	47.64	0.03685	357.6	0.07261
6.72	0.01304	50.46	0.04179	378.6	0.07382
7.14	0.008945	53.46	-0.01353	400.8	0.07224
7.56	0.008834	56.64	0.06782	424.8	0.0682
7.98	0.01088	60.	0.06217	450.	0.0708
8.46	0.01123	63.6	0.0535	476.4	0.06755
9.	0.01172	67.2	0.06761	504.6	0.069
9.48	0.009799	71.4	0.06553	534.6	0.07069
10.08	0.01258	75.6	0.06372	566.4	0.06894
10.68	0.01088	79.8	0.06143	600.	0.06991
11.28	0.00892	84.6	0.063	636.	0.06594

SOLUTION

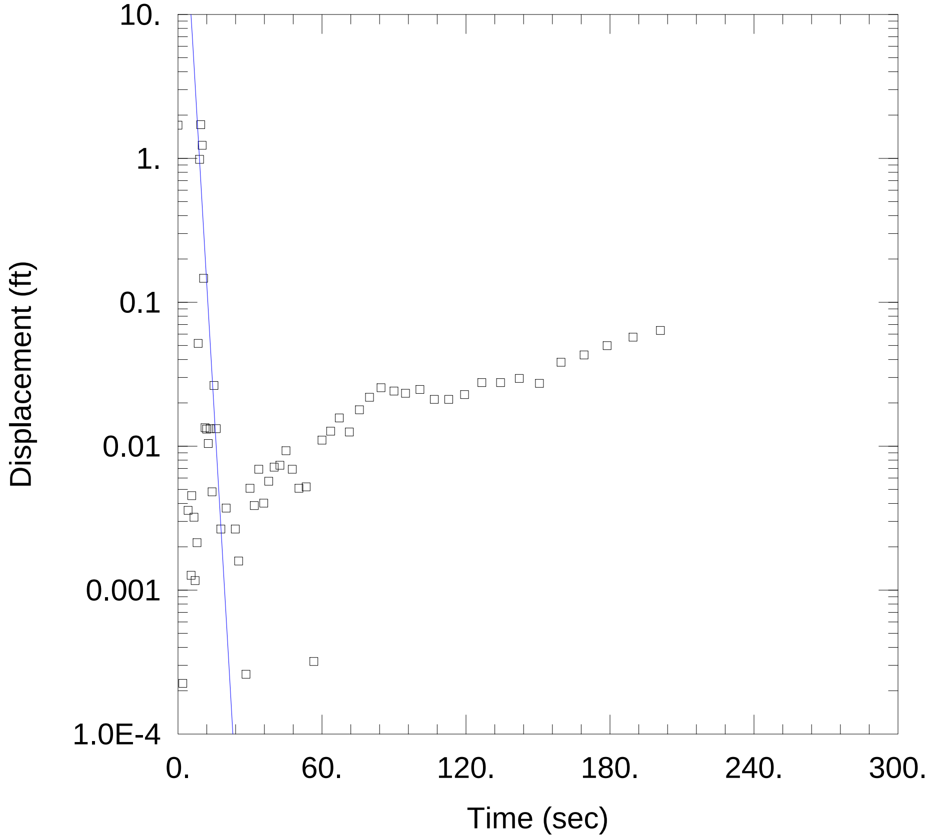
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.262

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	33.49	ft/day
y0	7335.5	ft

K = 0.01182 cm/sec
T = K*b = 674.2 ft²/day (7.25 sq. cm/sec)



WELL TEST ANALYSIS

Data Set: T:\...\MMW-P-02 OUT (B-R 1976).aqt
Date: 04/10/13 Time: 16:31:49

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Well: MMW-P-02
Test Date: 3-29-2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 44.42 ft/day
y0 = 363.2 ft

AQUIFER DATA

Saturated Thickness: 20.13 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MMW-P-02)

Initial Displacement: 1.7 ft
Total Well Penetration Depth: 10.63 ft
Casing Radius: 0.083 ft
Static Water Column Height: 20.13 ft
Screen Length: 10. ft
Well Radius: 0.33 ft

Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\Bouwer-Rice 1976\MMW-P-02 OUT (B-R 1976).aqt
Date: 04/10/13
Time: 16:31:07

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Date: 3-29-2013
Test Well: MMW-P-02

AQUIFER DATA

Saturated Thickness: 20.13 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-02

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.7 ft
Static Water Column Height: 20.13 ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.33 ft
Screen Length: 10. ft
Total Well Penetration Depth: 10.63 ft

No. of Observations: 85

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.25	-0.003103	8.46	0.05177	45.	0.009301
0.5	-0.007002	9.	0.9833	47.64	0.006901
0.75	-0.005798	9.48	1.714	50.46	0.005091
1.	-0.005666	10.08	1.233	53.46	0.005212
1.25	-0.004948	10.68	0.1468	56.64	0.000319
1.5	-0.00375	11.28	0.01345	60.	0.011
1.75	-0.008705	11.94	0.01313	63.6	0.01269
2.	0.000225	12.66	0.01044	67.2	0.01572
2.25	-0.008119	13.44	0.01325	71.4	0.01255
2.5	-0.005338	14.22	0.004814	75.6	0.01789
2.75	-0.002539	15.06	0.02638	79.8	0.02187
3.	-0.006428	15.96	0.01325	84.6	0.02548
3.25	-0.001491	16.92	-0.002299	90.	0.02415

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.5	-0.001856	17.88	0.002651	94.8	0.0233
3.75	-0.00401	18.96	-0.000374	100.8	0.02475
4.	-0.002686	20.1	0.00371	106.8	0.02114
4.25	0.003576	21.3	-0.001323	112.8	0.02114
4.5	-0.000771	22.56	-0.001568	119.4	0.02283
4.75	-0.003307	23.88	0.002651	126.6	0.02764
5.	-0.004133	25.32	0.00159	134.4	0.02764
5.251	-0.001491	26.82	-0.000374	142.2	0.02957
5.501	0.001268	28.38	0.00026	150.6	0.02728
5.751	0.00453	30.06	0.005091	159.6	0.03824
6.001	-0.000282	31.86	0.003865	169.2	0.04307
6.361	-0.000165	33.72	0.006901	178.8	0.04993
6.721	0.003206	35.76	0.004016	189.6	0.05715
7.141	0.001165	37.86	0.005701	201.	0.06365
7.56	-0.002334	40.08	0.007139		
7.98	0.002134	42.48	0.007375		

SOLUTION

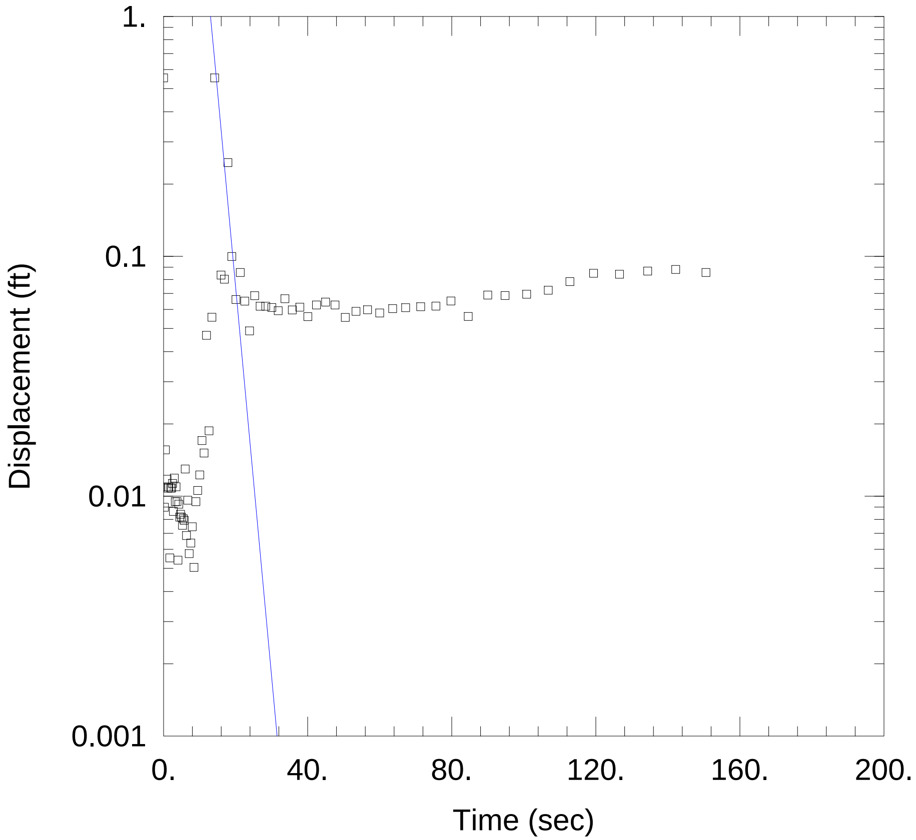
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.262

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	44.42	ft/day
y0	363.2	ft

K = 0.01567 cm/sec
T = K*b = 894.2 ft²/day (9.615 sq. cm/sec)



WELL TEST ANALYSIS

Data Set: T:\...\MMW-P-11S IN (RUN 3) (B-R 1976).aqt
Date: 04/10/13 Time: 16:37:34

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Well: MMW-P-11S
Test Date: 3-29-2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 32.9 ft/day
y0 = 132.4 ft

AQUIFER DATA

Saturated Thickness: 16.17 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MMW-P-11S)

Initial Displacement: 0.5545 ft
Total Well Penetration Depth: 6.17 ft
Casing Radius: 0.083 ft
Static Water Column Height: 16.17 ft
Screen Length: 6.17 ft
Well Radius: 0.33 ft

AQTESOLV for Windows

Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\Bouwer-Rice 1976\MMW-P-11S IN (RUN 3) (B-R 1976).aqt
Date: 04/10/13
Time: 16:37:19

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Date: 3-29-2013
Test Well: MMW-P-11S

AQUIFER DATA

Saturated Thickness: 16.17 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-11S

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 0.5545 ft
Static Water Column Height: 16.17 ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.33 ft
Screen Length: 6.17 ft
Total Well Penetration Depth: 6.17 ft

No. of Observations: 80

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.251	0.008993	7.561	0.00637	35.76	0.05973
0.501	0.01561	7.981	0.007456	37.86	0.06129
0.751	0.01092	8.461	0.005047	40.08	0.05602
1.001	0.01176	9.001	0.00948	42.48	0.06264
1.251	0.01079	9.481	0.01056	45.	0.06444
1.501	0.01092	10.08	0.01225	47.64	0.06264
1.751	0.005527	10.68	0.01705	50.46	0.05555
2.001	0.01081	11.28	0.01512	53.46	0.0589
2.251	0.01081	11.94	0.0468	56.64	0.05985
2.501	0.01129	12.66	0.01874	60.	0.05805
2.751	0.008638	13.44	0.05568	63.6	0.06046
3.001	0.01188	14.22	0.5545	67.2	0.06105
3.251	0.00948	15.06	-0.2492	71.4	0.06164

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.501	0.01094	15.96	0.08352	75.6	0.062
3.751	0.00948	16.92	0.08017	79.8	0.06512
4.001	0.005408	17.88	0.2455	84.6	0.05613
4.251	0.009253	18.96	0.09971	90.	0.06896
4.501	0.008174	20.1	0.06598	94.8	0.06859
4.751	0.008401	21.3	0.08556	100.8	0.06945
5.001	0.008174	22.56	0.06504	106.8	0.07221
5.251	0.007562	23.88	0.04885	112.8	0.07843
5.501	0.008044	25.32	0.06851	119.4	0.08493
5.751	0.007927	26.82	0.06191	126.6	0.08417
6.001	0.01297	28.38	0.0619	134.4	0.08682
6.361	0.006848	30.06	0.06118	142.2	0.08814
6.721	0.00961	31.86	0.05926	150.6	0.08561
7.141	0.00576	33.72	0.06649		

SOLUTION

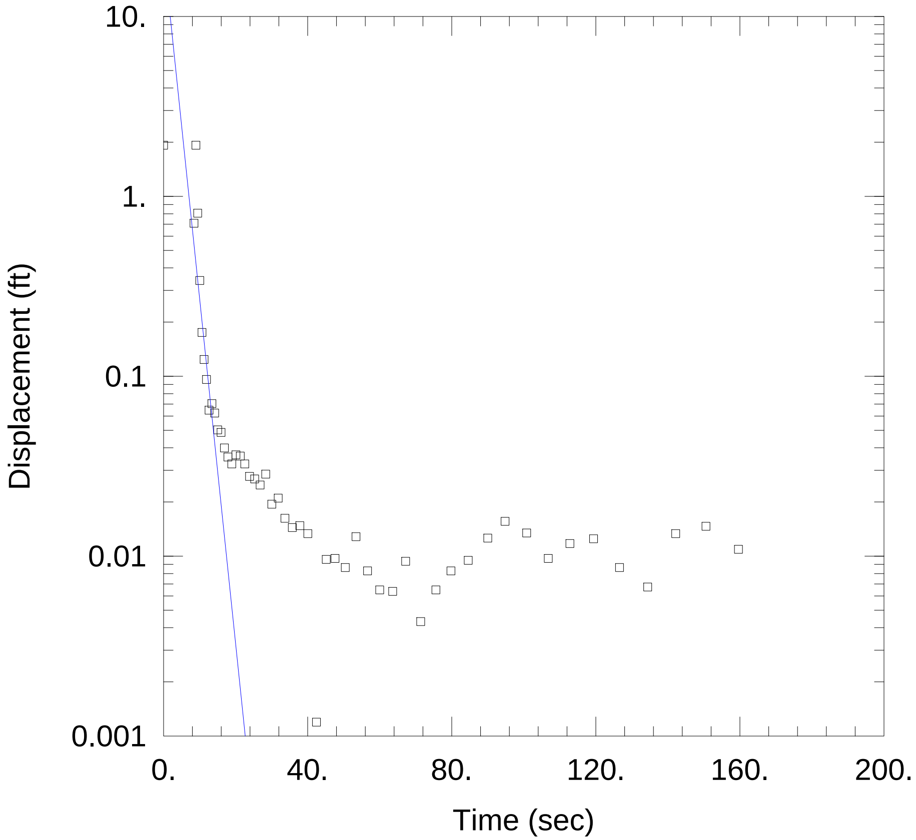
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.823

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	32.9	ft/day
y0	132.4	ft

K = 0.01161 cm/sec
T = K*b = 532. ft²/day (5.721 sq. cm/sec)



WELL TEST ANALYSIS

Data Set: T:\...\MMW-P-11S OUT (RUN 2) (B-R 1976).aqt
Date: 04/10/13 Time: 16:41:23

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Well: MMW-P-11S
Test Date: 3-29-2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 38.88 ft/day
y0 = 22.55 ft

AQUIFER DATA

Saturated Thickness: 16.17 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MMW-P-11S)

Initial Displacement: 1.923 ft
Total Well Penetration Depth: 6.17 ft
Casing Radius: 0.083 ft
Static Water Column Height: 16.17 ft
Screen Length: 6.17 ft
Well Radius: 0.33 ft

Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\Bouwer-Rice 1976\MMW-P-11S OUT (RUN 2) (B-R 1976).aqt
Date: 04/10/13
Time: 16:41:39

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Date: 3-29-2013
Test Well: MMW-P-11S

AQUIFER DATA

Saturated Thickness: 16.17 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-11S

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.923 ft
Static Water Column Height: 16.17 ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.33 ft
Screen Length: 6.17 ft
Total Well Penetration Depth: 6.17 ft

No. of Observations: 81

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.25	-0.01164	7.561	-0.01356	35.76	0.01441
0.5	-0.01307	7.98	-0.01403	37.86	0.01478
0.75	-0.01247	8.461	0.7083	40.08	0.01334
1.	-0.0085	9.	1.923	42.48	0.001193
1.25	-0.01511	9.48	0.8051	45.17	0.009592
1.5	-0.01093	10.08	0.3407	47.64	0.009715
1.75	-0.01285	10.68	0.1751	50.46	0.008645
2.	-0.0126	11.28	0.1237	53.46	0.01283
2.25	-0.01248	11.94	0.09599	56.64	0.008275
2.5	-0.01381	12.66	0.06467	60.	0.00648
2.75	-0.01163	13.44	0.07033	63.6	0.006368
3.	-0.0126	14.22	0.0624	67.2	0.009352
3.25	-0.009962	15.06	0.05027	71.4	0.004325

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.5	-0.01427	15.96	0.04872	75.6	0.00648
3.75	-0.01237	16.92	0.03995	79.8	0.008275
4.	-0.01104	17.88	0.03552	84.6	0.00948
4.25	-0.01151	18.96	0.03252	90.	0.0126
4.5	-0.01525	20.1	0.0366	94.8	0.01559
4.75	-0.01166	21.3	0.03599	100.8	0.01344
5.	-0.01346	22.56	0.03252	106.8	0.009706
5.251	-0.007694	23.88	0.02771	112.8	0.01175
5.501	-0.01321	25.32	0.02687	119.4	0.01248
5.751	-0.01273	26.82	0.02485	126.6	0.008645
6.001	-0.01032	28.38	0.02856	134.4	0.006734
6.361	-0.01094	30.06	0.01944	142.2	0.01334
6.721	-0.01058	31.86	0.021	150.6	0.01464
7.141	-0.01081	33.72	0.01622	159.6	0.01091

SOLUTION

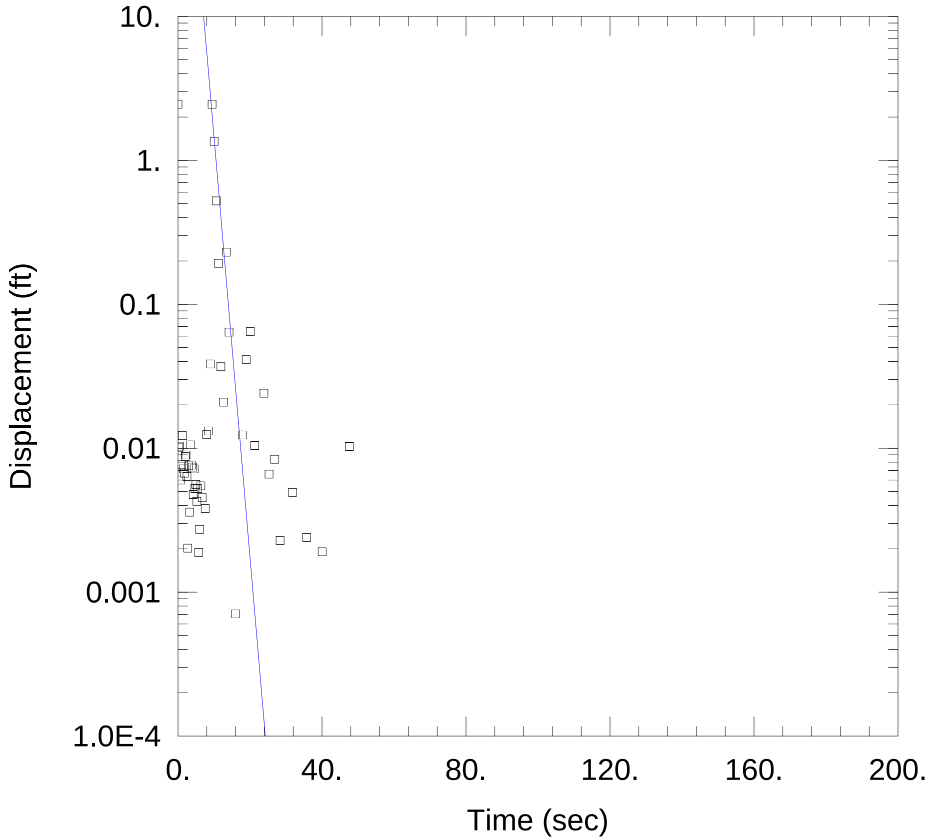
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 1.823

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	38.88	ft/day
y0	22.55	ft

K = 0.01371 cm/sec
T = K*b = 628.6 ft²/day (6.759 sq. cm/sec)



WELL TEST ANALYSIS

Data Set: T:\...\MMW-P-11DR IN (B-R 1976).aqt
Date: 04/10/13 Time: 16:40:24

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Well: MMW-P-11DR
Test Date: 3-29-2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 84.96 ft/day
y0 = 1219.1 ft

AQUIFER DATA

Saturated Thickness: 16.97 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MMW-P-11DR)

Initial Displacement: 2.452 ft
Total Well Penetration Depth: 13.97 ft
Casing Radius: 0.083 ft
Static Water Column Height: 16.97 ft
Screen Length: 5. ft
Well Radius: 0.33 ft

Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\Bouwer-Rice 1976\MMW-P-11DR IN (B-R 1976).aqt
Date: 04/10/13
Time: 16:40:05

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Date: 3-29-2013
Test Well: MMW-P-11DR

AQUIFER DATA

Saturated Thickness: 16.97 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-11DR

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 2.452 ft
Static Water Column Height: 16.97 ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.33 ft
Screen Length: 5. ft
Total Well Penetration Depth: 13.97 ft

No. of Observations: 73

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.251	0.01008	6.721	0.004525	28.38	0.002283
0.501	0.01032	7.141	-0.000123	30.06	-0.001674
0.751	0.006003	7.561	0.003803	31.86	0.004924
1.001	0.007665	7.981	0.01243	33.72	-0.000964
1.251	0.01222	8.461	0.01317	35.76	0.002394
1.501	0.007183	9.001	0.03848	37.86	-0.003805
1.751	0.006701	9.481	2.452	40.08	0.001907
2.001	0.008735	10.08	1.355	42.48	-0.002874
2.251	0.008967	10.68	0.5223	45.	-0.004052
2.501	0.006344	11.28	0.1922	47.64	0.01028
2.751	0.002017	11.94	0.0368	50.46	-0.002394
3.001	0.007533	12.66	0.02084	53.46	-0.003204
3.251	0.003585	13.44	0.2302	56.64	-0.007419

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.501	0.01053	14.22	0.064	60.	-0.008845
3.751	0.007643	15.06	-0.03358	63.6	-0.005261
4.001	0.007386	15.96	0.000705	67.2	-0.01399
4.251	0.004772	16.92	-0.006727	71.4	-0.01652
4.501	0.007179	17.88	0.01235	75.6	-0.01482
4.751	0.005241	18.96	0.04125	79.8	-0.01423
5.001	0.005604	20.1	0.06473	84.6	-0.01521
5.251	0.004276	21.3	0.01044	90.	-0.01999
5.501	0.005241	22.56	-0.01221	94.8	-0.02118
5.751	0.001887	23.88	0.0241	100.8	-0.02766
6.001	0.002733	25.32	0.006591		
6.361	0.005479	26.85	0.008368		

SOLUTION

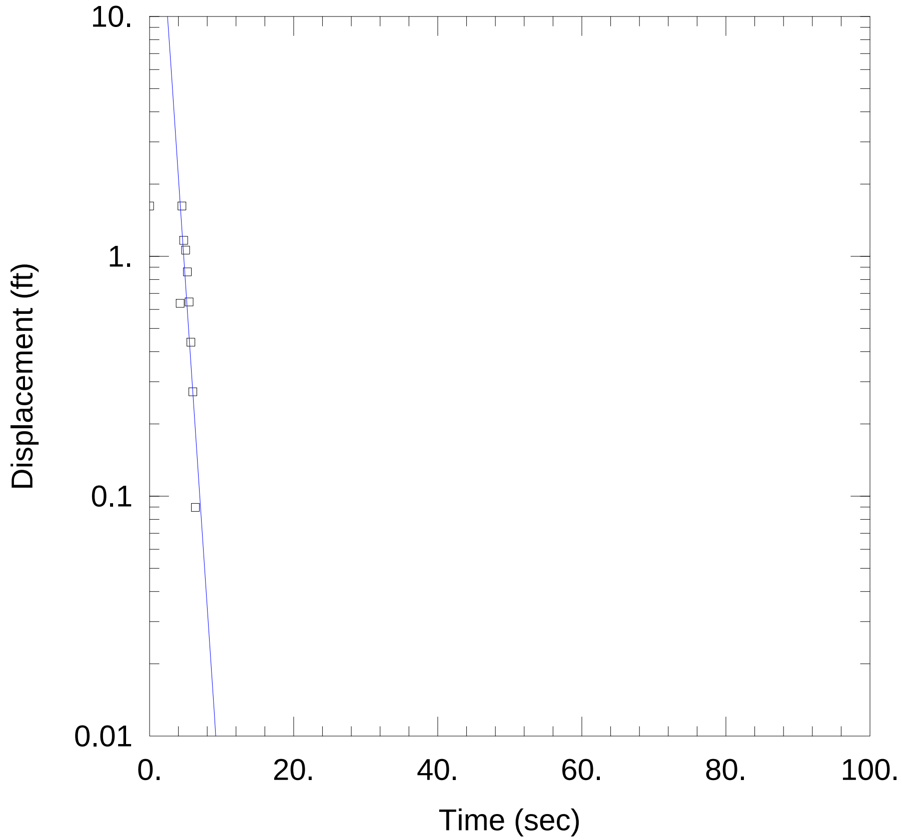
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 0.

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	84.96	ft/day
y0	1219.1	ft

K = 0.02997 cm/sec
T = K*b = 1441.7 ft²/day (15.5 sq. cm/sec)



WELL TEST ANALYSIS

Data Set: T:\...\MMW-P-11DR OUT (B-R 1976).aqt
Date: 04/10/13 Time: 16:38:54

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Well: MMW-P-11DR
Test Date: 3-29-2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 130.3 ft/day
y0 = 132.7 ft

AQUIFER DATA

Saturated Thickness: 16.97 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MMW-P-11DR)

Initial Displacement: 1.621 ft
Total Well Penetration Depth: 13.97 ft
Casing Radius: 0.083 ft

Static Water Column Height: 16.97 ft
Screen Length: 5. ft
Well Radius: 0.33 ft

Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\Bouwer-Rice 1976\MMW-P-11DR OUT (B-R 1976).aqt
Date: 04/10/13
Time: 16:38:38

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Date: 3-29-2013
Test Well: MMW-P-11DR

AQUIFER DATA

Saturated Thickness: 16.97 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-11DR

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.621 ft
Static Water Column Height: 16.97 ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.33 ft
Screen Length: 5. ft
Total Well Penetration Depth: 13.97 ft

No. of Observations: 72

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.25	-0.1126	6.36	0.08968	25.32	-0.1171
0.5	-0.1113	6.72	-0.03156	26.82	-0.1193
0.75	-0.113	7.14	-0.104	28.38	-0.1194
1.228	-0.1177	7.56	-0.1364	30.06	-0.118
1.449	-0.1212	7.98	-0.1402	31.86	-0.119
1.67	-0.1107	8.461	-0.136	33.72	-0.121
2.043	-0.1189	9.	-0.1248	35.76	-0.1206
2.264	-0.1098	9.48	-0.1164	37.86	-0.1205
2.485	-0.1121	10.08	-0.1135	40.08	-0.1156
2.705	-0.113	10.68	-0.1129	42.48	-0.1193
2.926	-0.1124	11.28	-0.1154	45.15	-0.1251
3.146	-0.1081	11.94	-0.1111	47.64	-0.1298
3.366	-0.09571	12.66	-0.1183	50.46	-0.1191

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.586	-0.1118	13.44	-0.116	53.46	-0.1215
3.806	-0.117	14.22	-0.116	56.64	-0.1144
4.026	-0.03699	15.06	-0.1179	60.	-0.1191
4.246	0.6362	15.96	-0.1203	63.6	-0.1167
4.5	1.621	16.92	-0.1158	67.2	-0.1121
4.75	1.165	17.88	-0.1141	71.4	-0.1215
5.	1.061	18.96	-0.1189	75.6	-0.1163
5.25	0.8605	20.1	-0.1164	79.8	-0.1187
5.5	0.645	21.3	-0.1165	84.6	-0.1212
5.75	0.4382	22.56	-0.1168	90.	-0.1245
6.	0.2723	23.88	-0.1178	94.8	-0.1219

SOLUTION

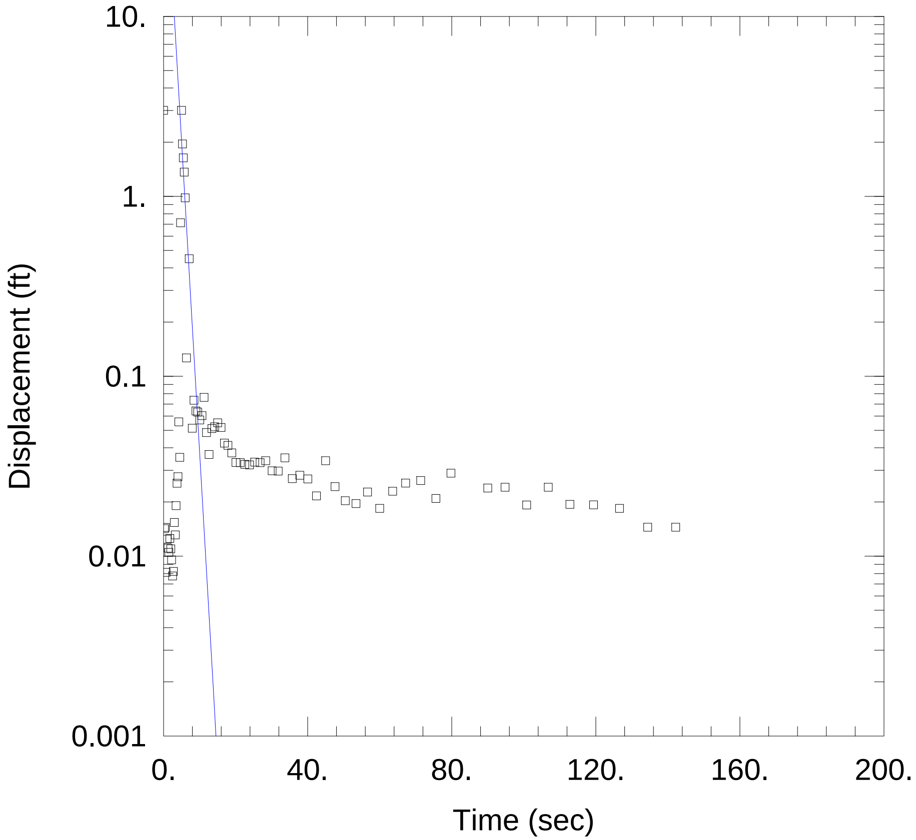
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 0.

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	130.3	ft/day
y0	132.7	ft

K = 0.04598 cm/sec
T = K*b = 2211.7 ft^2/day (23.78 sq. cm/sec)



WELL TEST ANALYSIS

Data Set: T:\...\MMW-P-13S IN (B-R 1976).aqt
Date: 04/10/13 Time: 16:50:37

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Well: MMW-P-13S
Test Date: 3-29-2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 57.4 ft/day
y0 = 106.6 ft

AQUIFER DATA

Saturated Thickness: 15.86 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MMW-P-13S)

Initial Displacement: 3.002 ft
Total Well Penetration Depth: 8.86 ft
Casing Radius: 0.083 ft
Static Water Column Height: 15.86 ft
Screen Length: 8.86 ft
Well Radius: 0.33 ft

Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\Bouwer-Rice 1976\MMW-P-13S IN (B-R 1976).aqt
Date: 04/10/13
Time: 16:51:01

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Date: 3-29-2013
Test Well: MMW-P-13S

AQUIFER DATA

Saturated Thickness: 15.86 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-13S

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 3.002 ft
Static Water Column Height: 15.86 ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.33 ft
Screen Length: 8.86 ft
Total Well Penetration Depth: 8.86 ft

No. of Observations: 79

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.251	0.01421	7.561	-0.1045	35.76	0.02697
0.501	0.01444	7.981	0.05142	37.86	0.02817
0.751	0.00813	8.461	0.07351	40.08	0.02685
1.001	0.01241	9.001	0.06409	42.48	0.02162
1.251	0.01107	9.481	0.06313	45.	0.0339
1.501	0.0105	10.08	0.05717	47.64	0.02436
1.751	0.01254	10.68	0.06038	50.46	0.02031
2.001	0.01097	11.28	0.07624	53.46	0.01958
2.251	0.00953	11.94	0.04857	56.64	0.02271
2.501	0.007747	12.66	0.03675	60.	0.01841
2.751	0.008224	13.44	0.05119	63.6	0.02294
3.001	0.01539	14.22	0.05237	67.2	0.02544
3.251	0.01312	15.06	0.05512	71.4	0.02629

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.501	0.01907	15.96	0.05188	75.6	0.02092
3.751	0.02542	16.92	0.04249	79.8	0.0289
4.001	0.02765	17.88	0.04128	84.6	-0.0129
4.251	0.05571	18.96	0.03747	90.	0.02389
4.501	0.03542	20.1	0.03317	94.8	0.02414
4.751	0.7127	21.3	0.03306	100.8	0.01923
5.001	3.002	22.56	0.03235	106.8	0.02416
5.251	1.953	23.88	0.03213	112.8	0.01938
5.501	1.635	25.32	0.0333	119.4	0.01926
5.751	1.364	26.82	0.03306	126.6	0.01841
6.001	0.9806	28.38	0.0339	134.4	0.01447
6.361	0.1264	30.15	0.02982	142.2	0.01448
6.721	-0.1229	31.86	0.02971		
7.141	0.4501	33.72	0.03518		

SOLUTION

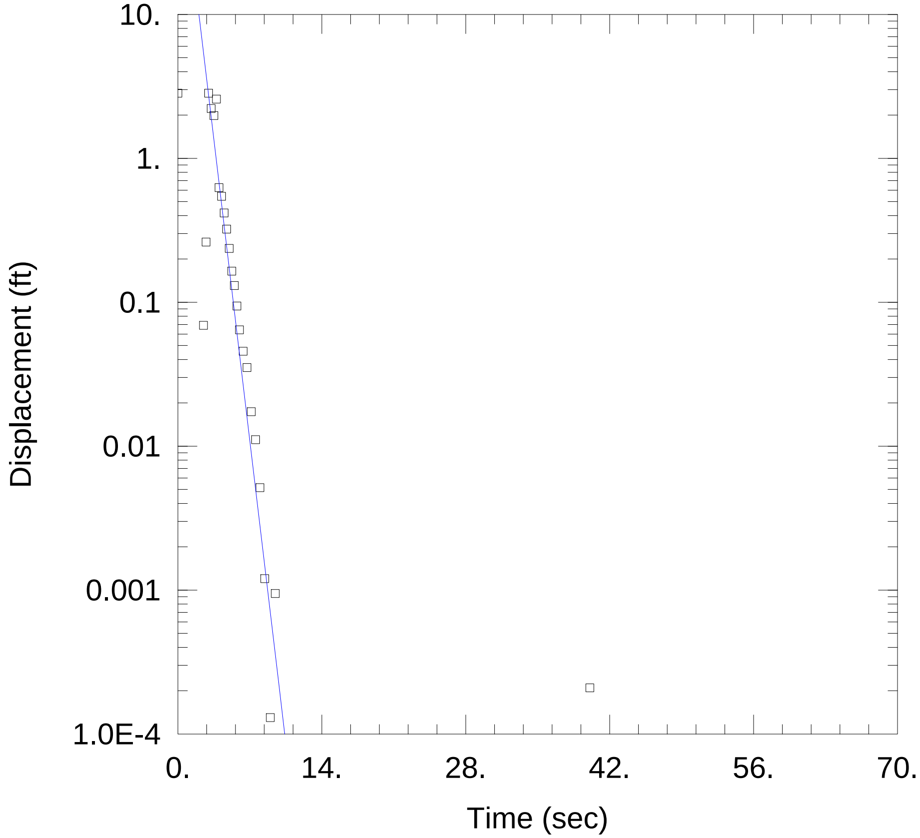
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.151

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	57.4	ft/day
y0	106.6	ft

K = 0.02025 cm/sec
T = K*b = 910.3 ft²/day (9.788 sq. cm/sec)



WELL TEST ANALYSIS

Data Set: T:\...\MMW-P-13S OUT (B-R 1976).aqt
Date: 04/10/13 Time: 16:51:51

PROJECT INFORMATION

Company: Mundell & Associates Inc
Client: AIMCO
Project: M01046
Test Well: MMW-P-13S
Test Date: 3-29-2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 99.58 ft/day
y0 = 168.2 ft

AQUIFER DATA

Saturated Thickness: 15.86 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MMW-P-13S)

Initial Displacement: 2.835 ft
Total Well Penetration Depth: 8.86 ft
Casing Radius: 0.083 ft

Static Water Column Height: 15.86 ft
Screen Length: 8.86 ft
Well Radius: 0.33 ft

Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\Bouwer-Rice 1976\MMW-P-13S OUT (B-R 1976).aqt
Date: 04/10/13
Time: 16:52:08

PROJECT INFORMATION

Company: Mundell & Associates Inc
Client: AIMCO
Project: M01046
Test Date: 3-29-2013
Test Well: MMW-P-13S

AQUIFER DATA

Saturated Thickness: 15.86 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-13S

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 2.835 ft
Static Water Column Height: 15.86 ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.33 ft
Screen Length: 8.86 ft
Total Well Penetration Depth: 8.86 ft

No. of Observations: 66

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.251	-0.01421	5.751	0.0942	20.1	-0.006091
0.501	-0.01469	6.001	0.06438	21.3	-0.01398
0.751	-0.01446	6.361	0.04561	22.56	-0.00693
1.001	-0.01313	6.721	0.0352	23.88	-0.01119
1.251	-0.005877	7.141	0.01734	25.32	-0.005276
1.501	-0.01265	7.561	0.0111	26.82	-0.004197
1.751	-0.0123	7.981	0.00515	28.38	-0.01299
2.001	-0.0111	8.461	0.0012	30.06	-0.01071
2.251	-0.01134	9.001	0.00013	31.86	-0.007493
2.501	0.06911	9.481	0.000947	33.72	-0.002418
2.751	0.2622	10.08	-0.001663	35.76	-0.00087
3.001	2.835	10.68	-0.003444	37.86	-0.00397
3.251	2.218	11.28	-0.002493	40.08	0.000209

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.501	1.983	11.94	-0.005137	42.48	-0.005523
3.751	2.578	12.66	-0.007643	45.	-0.004571
4.001	0.6254	13.44	-0.004644	47.64	-0.00565
4.251	0.5441	14.22	-0.001929	50.46	-0.002308
4.501	0.4169	15.06	-0.002512	53.46	-0.007198
4.751	0.3226	15.96	-0.002982	56.64	-0.008738
5.001	0.2363	16.92	-0.003349	60.	-0.005873
5.251	0.1643	17.88	-0.005877	63.65	-0.0123
5.501	0.1308	18.96	-0.004794	67.2	-0.008614

SOLUTION

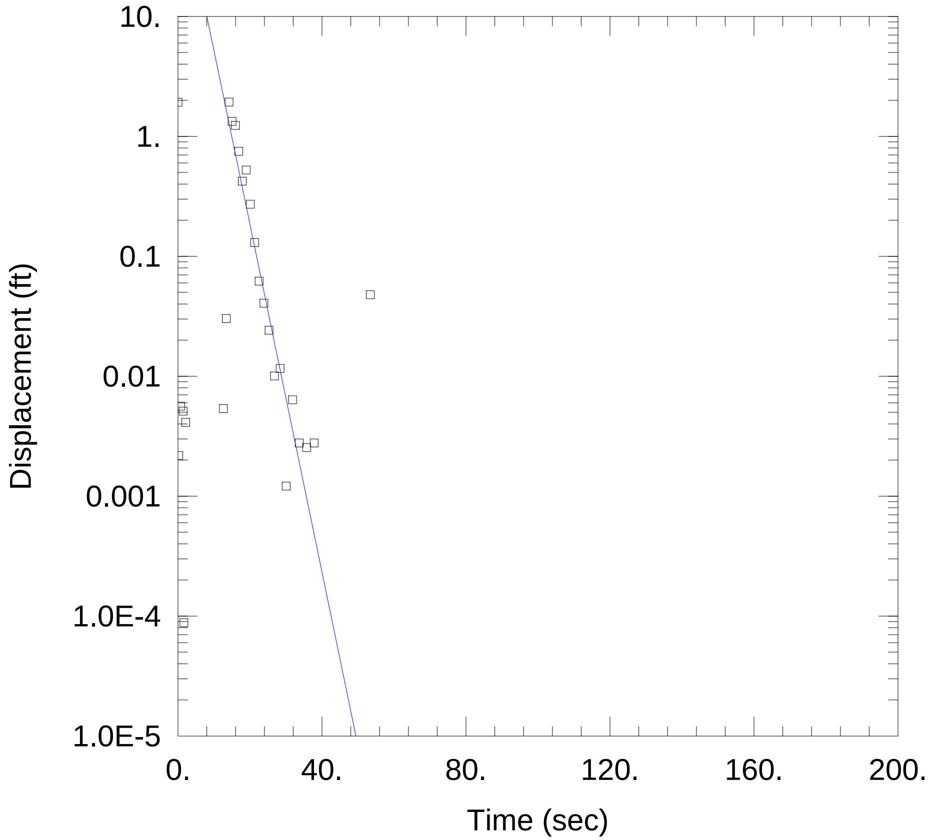
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.151

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	99.58	ft/day
y0	168.2	ft

K = 0.03513 cm/sec
T = K*b = 1579.3 ft^2/day (16.98 sq. cm/sec)



WELL TEST ANALYSIS

Data Set: T:\...\MMW-P-13D IN (B-R 1976).aqt
Date: 04/10/13 Time: 16:47:13

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Well: MMW-P-13D
Test Date: 3-29-2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 51.97 ft/day
y0 = 145.9 ft

AQUIFER DATA

Saturated Thickness: 16.1 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MMW-P-13D)

Initial Displacement: 1.929 ft
Total Well Penetration Depth: 16.1 ft
Casing Radius: 0.083 ft

Static Water Column Height: 16.1 ft
Screen Length: 5. ft
Well Radius: 0.33 ft

Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\Bouwer-Rice 1976\MMW-P-13D IN (B-R 1976).aqt
Date: 04/10/13
Time: 16:47:40

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Date: 3-29-2013
Test Well: MMW-P-13D

AQUIFER DATA

Saturated Thickness: 16.1 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-13D

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.929 ft
Static Water Column Height: 16.1 ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.33 ft
Screen Length: 5. ft
Total Well Penetration Depth: 16.1 ft

No. of Observations: 74

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.251	0.00218	6.721	-0.007077	28.38	0.01162
0.501	-0.000709	7.141	-0.005754	30.06	0.001213
0.751	0.00562	7.561	-0.007907	31.86	0.006362
1.23	-0.000751	7.981	-0.01244	33.72	0.002779
1.451	0.005111	8.461	-0.01052	35.76	0.002541
1.671	8.8E-5	9.001	-0.01244	37.86	0.002779
2.166	0.004127	9.481	-0.01221	40.08	-0.00569
2.387	-5.3E-5	10.08	-0.009325	42.48	-0.01048
2.607	-0.002904	10.68	-0.004195	45.	-0.0082
2.889	-0.007201	11.28	-0.01029	47.64	-0.002605
3.109	-0.006337	11.94	-0.01016	50.46	-0.009869
3.329	-0.007295	12.66	0.005371	53.46	0.04782
3.549	-0.007529	13.44	0.03024	56.64	-0.005241

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.769	-0.01029	14.22	1.929	60.	-0.01213
3.989	-0.004331	15.06	1.334	63.6	-0.01358
4.209	-0.007201	15.96	1.235	67.2	-0.0113
4.43	-0.008017	16.92	0.7503	71.4	-0.01441
4.65	-0.005173	17.88	0.4228	75.6	-0.01405
4.872	-0.006588	18.96	0.5238	79.8	-0.0206
5.092	-0.005754	20.1	0.2713	84.6	-0.01573
5.312	-0.006236	21.3	0.1302	90.	-0.01504
5.532	-0.009365	22.56	0.06195	94.8	-0.01933
5.753	-0.003862	23.88	0.04065	100.8	-0.0204
6.001	-0.007198	25.32	0.02418	106.8	-0.02194
6.361	-0.007577	26.82	0.01006		

SOLUTION

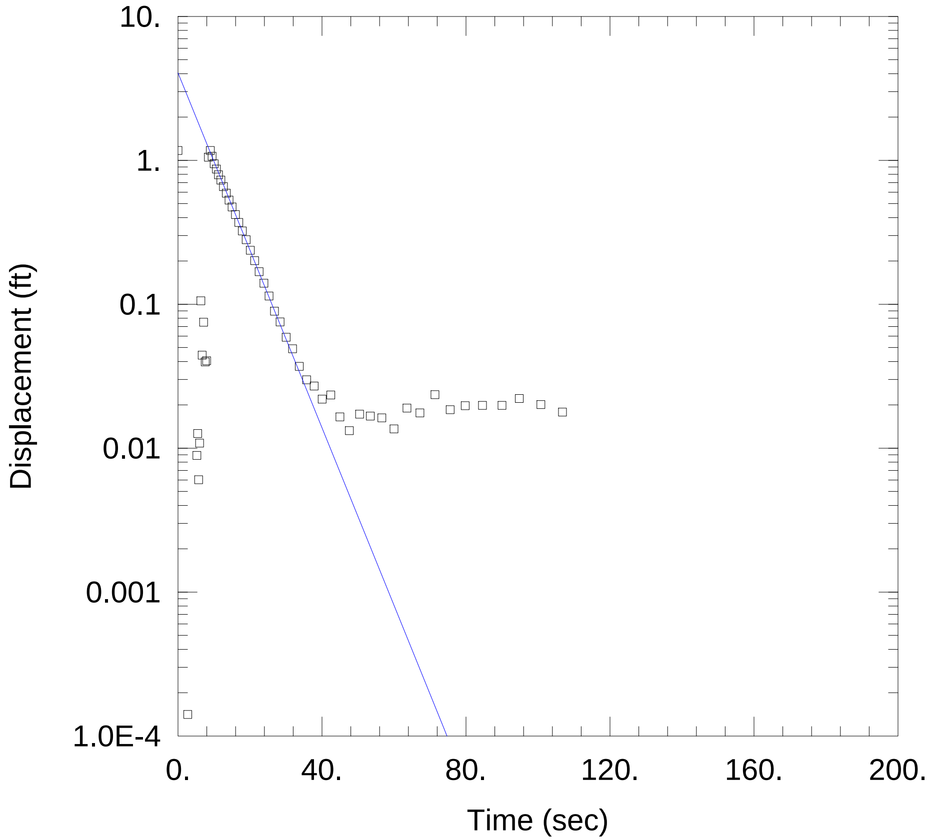
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.616

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	51.97	ft/day
y0	145.9	ft

K = 0.01833 cm/sec
T = K*b = 836.8 ft²/day (8.997 sq. cm/sec)



WELL TEST ANALYSIS

Data Set: T:\...\MMW-P-13D OUT (B-R 1976).aqt
Date: 04/10/13 Time: 16:49:18

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Well: MMW-P-13D
Test Date: 3-29-2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 22.11 ft/day
y0 = 4.053 ft

AQUIFER DATA

Saturated Thickness: 16.1 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MMW-P-13D)

Initial Displacement: 1.17 ft
Total Well Penetration Depth: 16.1 ft
Casing Radius: 0.083 ft
Static Water Column Height: 16.1 ft
Screen Length: 5. ft
Well Radius: 0.33 ft

Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\Bouwer-Rice 1976\MMW-P-13D OUT (B-R 1976).aqt
Date: 04/10/13
Time: 16:49:35

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Date: 3-29-2013
Test Well: MMW-P-13D

AQUIFER DATA

Saturated Thickness: 16.1 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-13D

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.17 ft
Static Water Column Height: 16.1 ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.33 ft
Screen Length: 5. ft
Total Well Penetration Depth: 16.1 ft

No. of Observations: 74

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.251	-0.005615	6.721	0.04432	28.38	0.07543
0.501	-0.005245	7.141	0.07505	30.06	0.05893
0.751	-0.008139	7.561	0.03976	31.86	0.049
1.001	-0.008821	7.981	0.04047	33.72	0.03705
1.251	-0.00739	8.461	1.052	35.76	0.02987
1.501	-0.007973	9.001	1.17	37.86	0.02701
1.751	-0.008335	9.481	1.068	40.08	0.02188
2.001	-0.003191	10.08	0.947	42.48	0.02339
2.251	-0.00129	10.68	0.869	45.	0.01649
2.501	-0.005485	11.28	0.7928	47.64	0.01322
2.751	0.000141	11.94	0.7288	50.46	0.01721
3.001	-0.005941	12.66	0.6572	53.46	0.01672
3.251	-0.005602	13.44	0.5912	56.64	0.01625

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.501	-0.006078	14.22	0.5295	60.	0.01363
3.751	-0.004393	15.06	0.4745	63.6	0.019
4.001	-0.009136	15.96	0.4201	67.2	0.01757
4.251	-0.00748	16.92	0.3698	71.4	0.02352
4.501	-0.004842	17.88	0.3228	75.6	0.01851
4.751	-0.005212	18.96	0.2806	79.8	0.01972
5.001	-0.001731	20.1	0.2369	84.6	0.01984
5.251	0.008912	21.3	0.2011	90.	0.01984
5.501	0.01263	22.56	0.1684	94.8	0.02211
5.751	0.006036	23.88	0.1399	100.8	0.02009
6.001	0.01083	25.32	0.1142	106.8	0.01782
6.36	0.1058	26.82	0.08953		

SOLUTION

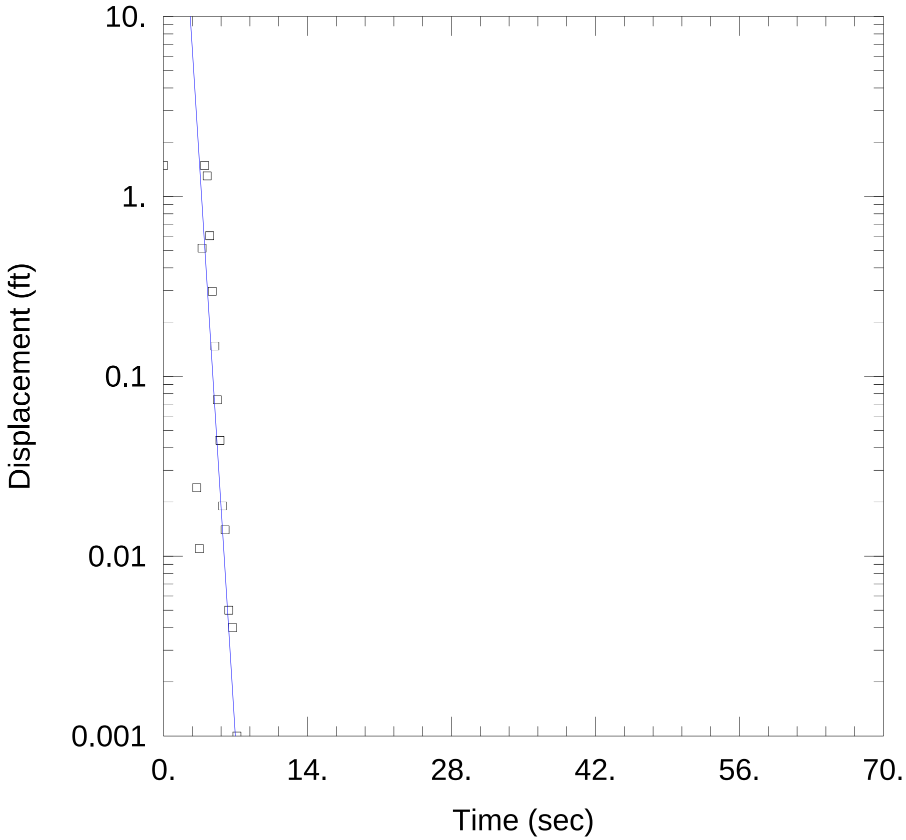
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.616

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	22.11	ft/day
y0	4.053	ft

K = 0.0078 cm/sec
T = K*b = 356. ft^2/day (3.828 sq. cm/sec)



WELL TEST ANALYSIS

Data Set: T:\...\MMW-P-14S OUT (B-R 1976).aqt
Date: 04/10/13 Time: 16:56:33

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Well: MMW-P-14S
Test Date: 4-1-2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 141.1 ft/day
y0 = 2352.1 ft

AQUIFER DATA

Saturated Thickness: 17.89 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MMW-P-14S)

Initial Displacement: 1.482 ft
Total Well Penetration Depth: 9.89 ft
Casing Radius: 0.083 ft

Static Water Column Height: 17.89 ft
Screen Length: 9.89 ft
Well Radius: 0.33 ft

Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\Bouwer-Rice 1976\MMW-P-14S OUT (B-R 1976).aqt
Date: 04/10/13
Time: 16:56:53

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Date: 4-1-2013
Test Well: MMW-P-14S

AQUIFER DATA

Saturated Thickness: 17.89 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-14S

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.482 ft
Static Water Column Height: 17.89 ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.33 ft
Screen Length: 9.89 ft
Total Well Penetration Depth: 9.89 ft

No. of Observations: 66

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.251	-0.014	5.751	0.019	20.1	-0.015
0.501	-0.009	6.001	0.014	21.3	-0.023
0.751	-0.015	6.361	0.005	22.6	-0.021
1.001	-0.011	6.721	0.004	23.88	-0.025
1.251	-0.016	7.141	0.001	25.32	-0.026
1.501	-0.012	7.561	-0.007	26.82	-0.024
1.751	-0.013	7.981	-0.002	28.38	-0.022
2.001	-0.011	8.461	-0.01	30.06	-0.025
2.251	-0.008	9.001	-0.011	31.86	-0.021
2.501	-0.011	9.481	-0.012	33.72	-0.025
2.751	-0.01	10.08	-0.013	35.76	-0.023
3.001	-0.011	10.68	-0.012	37.86	-0.025
3.251	0.024	11.28	-0.013	40.08	-0.025

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.501	0.011	11.94	-0.015	42.48	-0.024
3.751	0.515	12.66	-0.019	45.	-0.028
4.001	1.482	13.44	-0.018	47.64	-0.021
4.251	1.299	14.22	-0.017	50.46	-0.021
4.501	0.604	15.06	-0.033	53.46	-0.024
4.751	0.296	15.96	-0.034	56.64	-0.023
5.001	0.147	16.92	-0.031	60.	-0.028
5.251	0.074	17.88	-0.005	63.6	-0.024
5.501	0.044	18.96	-0.021	67.2	-0.025

SOLUTION

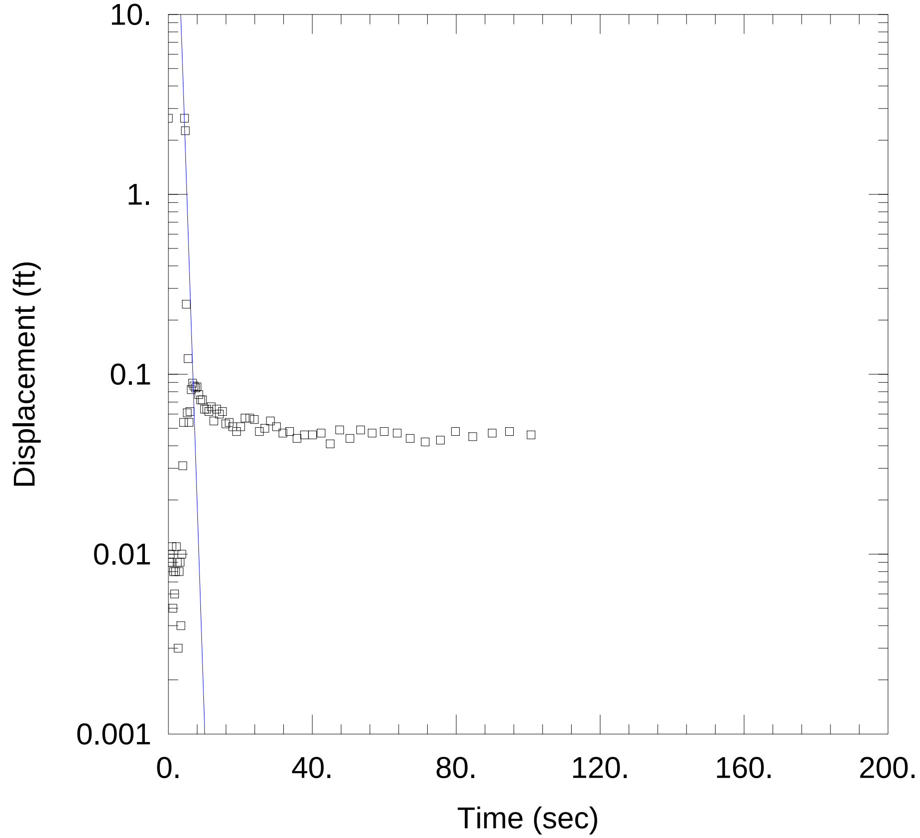
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.236

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	141.1	ft/day
y0	2352.1	ft

K = 0.04979 cm/sec
T = K*b = 2524.9 ft^2/day (27.15 sq. cm/sec)



WELL TEST ANALYSIS

Data Set: T:\...\MMW-P-14S-2 IN (B-R 1976).aqt
Date: 04/10/13 Time: 16:57:45

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Well: MMW-P-14S
Test Date: 4-1-2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 92.96 ft/day
y0 = 1186. ft

AQUIFER DATA

Saturated Thickness: 17.89 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MMW-P-14S)

Initial Displacement: 2.647 ft
Total Well Penetration Depth: 9.89 ft
Casing Radius: 0.083 ft
Static Water Column Height: 17.89 ft
Screen Length: 9.89 ft
Well Radius: 0.33 ft

Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\Bouwer-Rice 1976\MMW-P-14S-2 IN (B-R 1976).aqt
Date: 04/10/13
Time: 16:58:09

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Date: 4-1-2013
Test Well: MMW-P-14S

AQUIFER DATA

Saturated Thickness: 17.89 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-14S

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 2.647 ft
Static Water Column Height: 17.89 ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.33 ft
Screen Length: 9.89 ft
Total Well Penetration Depth: 9.89 ft

No. of Observations: 73

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.251	0.009	6.721	0.089	28.38	0.055
0.501	0.01	7.141	0.086	30.06	0.051
0.751	0.009	7.561	0.084	31.86	0.047
1.001	0.011	7.981	0.085	33.72	0.048
1.251	0.005	8.461	0.077	35.76	0.044
1.501	0.008	9.	0.072	37.86	0.046
1.751	0.006	9.48	0.072	40.08	0.046
2.001	0.008	10.08	0.064	42.48	0.047
2.251	0.011	10.69	0.064	45.	0.041
2.501	0.009	11.28	0.062	47.64	0.049
2.751	0.003	11.94	0.066	50.46	0.044
3.001	0.008	12.66	0.055	53.46	0.049
3.251	0.009	13.44	0.064	56.64	0.047

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.501	0.004	14.22	0.06	60.	0.048
3.751	0.01	15.06	0.062	63.6	0.047
4.001	0.031	15.96	0.053	67.2	0.044
4.251	0.054	16.92	0.054	71.4	0.042
4.501	2.647	17.88	0.051	75.6	0.043
4.751	2.255	18.96	0.048	79.8	0.048
5.001	0.245	20.1	0.051	84.6	0.045
5.251	0.061	21.3	0.057	90.	0.047
5.501	0.122	22.65	0.057	94.8	0.048
5.751	0.054	23.88	0.056	100.8	0.046
6.001	0.062	25.32	0.048		
6.361	0.082	26.82	0.05		

SOLUTION

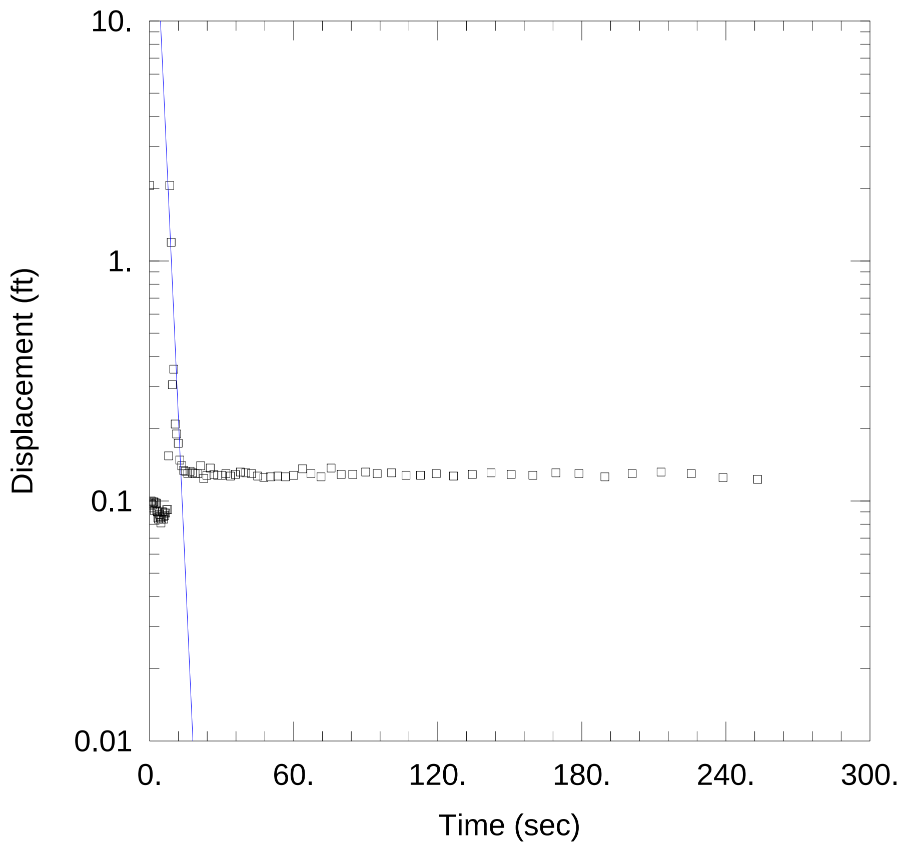
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.236

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	92.96	ft/day
y0	1186.	ft

K = 0.03279 cm/sec
T = K*b = 1663.1 ft^2/day (17.88 sq. cm/sec)



WELL TEST ANALYSIS

Data Set: T:\...\MMW-P-14D IN (B-R 1976).aqt
Date: 04/10/13 Time: 16:53:52

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Well: MMW-P-14D
Test Date: 4-1-2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 67.13 ft/day
y0 = 104.9 ft

AQUIFER DATA

Saturated Thickness: 17.61 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MMW-P-14D)

Initial Displacement: 2.061 ft
Total Well Penetration Depth: 15.61 ft
Casing Radius: 0.083 ft
Static Water Column Height: 17.61 ft
Screen Length: 5. ft
Well Radius: 0.33 ft

AQTESOLV for Windows

Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\Bouwer-Rice 1976\MMW-P-14D IN (B-R 1976).aqt
Date: 04/10/13
Time: 16:54:11

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Date: 4-1-2013
Test Well: MMW-P-14D

AQUIFER DATA

Saturated Thickness: 17.61 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-14D

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 2.061 ft
Static Water Column Height: 17.61 ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.33 ft
Screen Length: 5. ft
Total Well Penetration Depth: 15.61 ft

No. of Observations: 89

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.251	0.098	9.001	1.195	50.46	0.126
0.729	0.1	9.481	0.305	53.46	0.127
0.95	0.097	10.08	0.354	56.64	0.126
1.171	0.096	10.68	0.209	60.	0.128
1.662	0.099	11.28	0.19	63.74	0.136
1.883	0.099	11.94	0.174	67.2	0.13
2.106	0.091	12.66	0.148	71.4	0.126
2.591	0.098	13.44	0.14	75.6	0.137
2.812	0.098	14.22	0.134	79.8	0.129
3.032	0.091	15.06	0.133	84.6	0.129
3.255	0.09	15.96	0.13	90.	0.132
3.475	0.085	16.92	0.133	94.8	0.13
3.696	0.084	17.88	0.131	100.8	0.131

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.917	0.09	18.96	0.13	106.8	0.128
4.137	0.088	20.1	0.13	112.8	0.128
4.358	0.086	21.32	0.14	119.4	0.13
4.578	0.085	22.56	0.124	126.6	0.127
4.798	0.081	23.88	0.128	134.4	0.129
5.02	0.084	25.32	0.137	142.2	0.131
5.24	0.09	26.82	0.129	150.6	0.129
5.46	0.09	28.38	0.128	159.6	0.128
5.681	0.086	30.06	0.128	169.2	0.131
5.902	0.084	31.86	0.13	178.8	0.13
6.122	0.089	33.72	0.127	189.6	0.126
6.36	0.087	35.76	0.129	201.	0.13
6.721	0.089	37.86	0.132	213.	0.132
7.14	0.092	40.08	0.131	225.6	0.13
7.56	0.092	42.48	0.13	238.8	0.125
7.98	0.154	45.	0.127	253.2	0.123
8.461	2.061	47.64	0.125		

SOLUTION

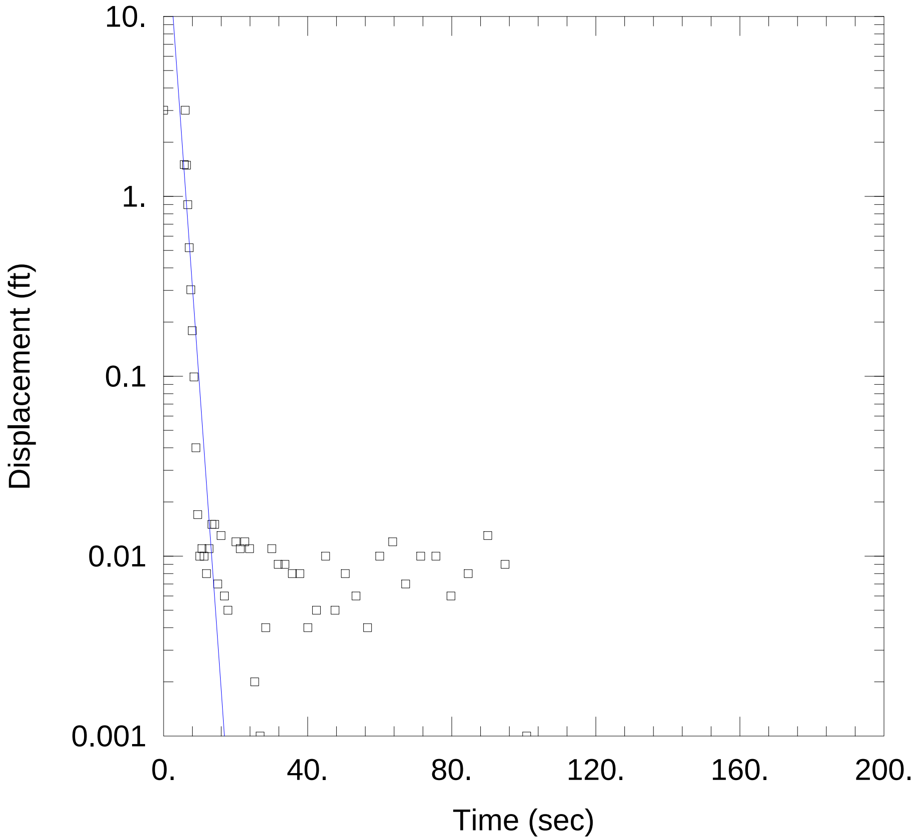
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.199

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	67.13	ft/day
y0	104.9	ft

K = 0.02368 cm/sec
T = K*b = 1182.2 ft²/day (12.71 sq. cm/sec)



WELL TEST ANALYSIS

Data Set: T:\...\MMW-P-14D OUT (B-R 1976).aqt
Date: 04/10/13 Time: 16:55:19

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Well: MMW-P-14D
Test Date: 4-1-2013

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 84.4 ft/day
y0 = 54.51 ft

AQUIFER DATA

Saturated Thickness: 17.61 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MMW-P-14D)

Initial Displacement: 3.008 ft
Total Well Penetration Depth: 15.61 ft
Casing Radius: 0.083 ft

Static Water Column Height: 17.61 ft
Screen Length: 5. ft
Well Radius: 0.33 ft

Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\Bouwer-Rice 1976\MMW-P-14D OUT (B-R 1976).aqt
Date: 04/10/13
Time: 16:55:37

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Date: 4-1-2013
Test Well: MMW-P-14D

AQUIFER DATA

Saturated Thickness: 17.61 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-14D

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 3.008 ft
Static Water Column Height: 17.61 ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.33 ft
Screen Length: 5. ft
Total Well Penetration Depth: 15.61 ft

No. of Observations: 73

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.251	-0.01	6.721	0.898	28.38	0.004
0.501	-0.007	7.141	0.518	30.06	0.011
0.751	-0.008	7.561	0.302	31.86	0.009
1.001	-0.011	7.981	0.179	33.72	0.009
1.251	-0.011	8.461	0.099	35.76	0.008
1.501	-0.011	9.001	0.04	37.86	0.008
1.751	-0.01	9.481	0.017	40.08	0.004
2.001	-0.009	10.08	0.01	42.48	0.005
2.251	-0.016	10.68	0.011	45.	0.01
2.501	-0.012	11.28	0.01	47.64	0.005
2.751	-0.01	11.94	0.008	50.46	0.008
3.001	-0.008	12.66	0.011	53.46	0.006
3.251	-0.009	13.44	0.015	56.64	0.004

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
3.501	-0.009	14.22	0.015	60.	0.01
3.751	-0.009	15.06	0.007	63.6	0.012
4.001	-0.008	15.96	0.013	67.2	0.007
4.251	-0.009	16.92	0.006	71.4	0.01
4.501	-0.011	17.88	0.005	75.6	0.01
4.751	-0.008	18.96	-0.01	79.8	0.006
5.001	-0.004	20.1	0.012	84.6	0.008
5.251	-0.008	21.3	0.011	90.	0.013
5.501	-0.006	22.56	0.012	94.8	0.009
5.751	1.5	23.88	0.011	100.8	0.001
6.001	3.008	25.32	0.002		
6.361	1.489	26.82	0.001		

SOLUTION

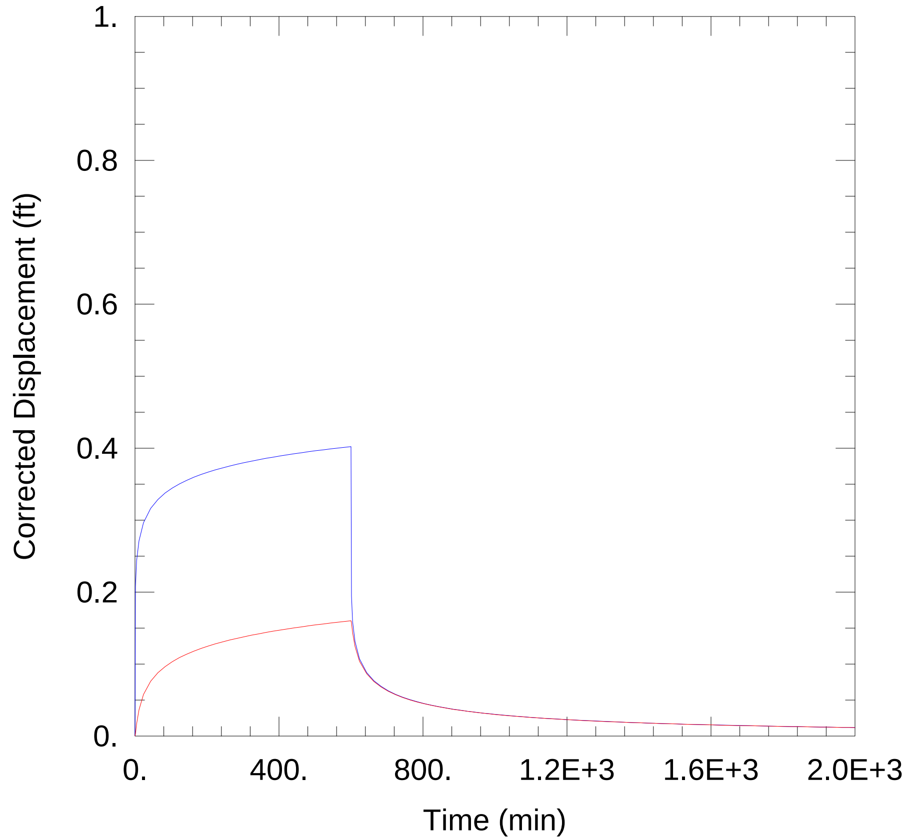
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.199

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	84.4	ft/day
y0	54.51	ft

K = 0.02977 cm/sec
T = K*b = 1486.2 ft^2/day (15.98 sq. cm/sec)



WELL TEST ANALYSIS

Data Set: T:\...\OW 10 ft_S = 0.1_ Rate=3 GPM_Recovery at 10 hrs
Date: 04/10/13 Time: 17:05:36

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 1400. ft^2/day
S = 0.1
Kz/Kr = 1.
b = 20. ft

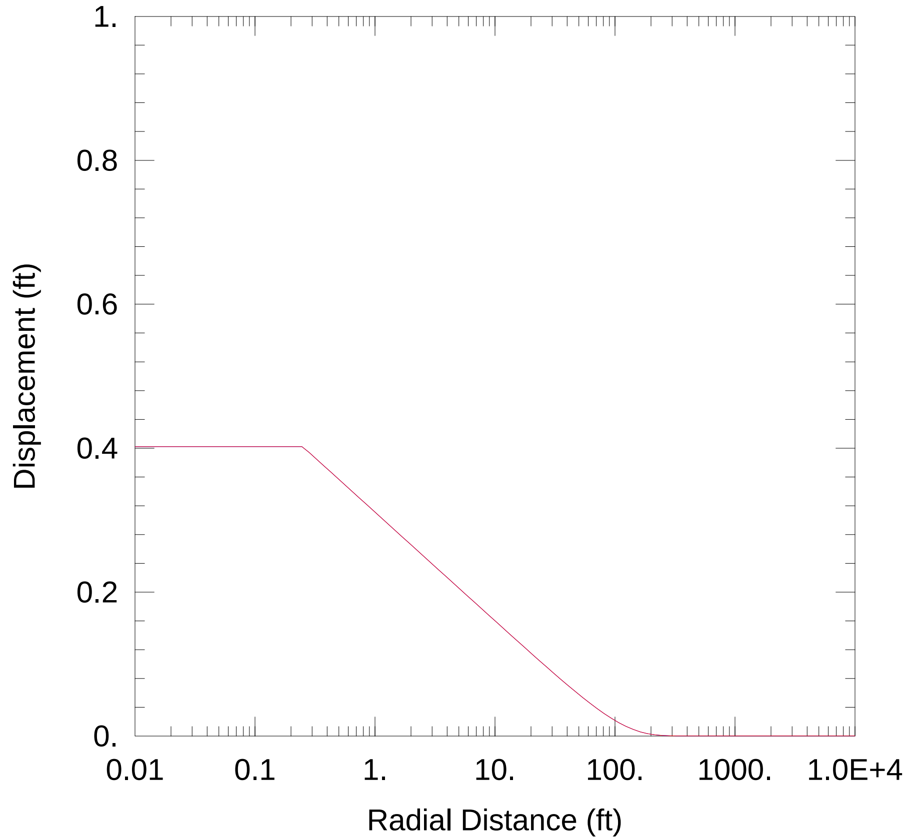
WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
PW	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
PW	0	0
OW	10	0



WELL TEST ANALYSIS

Data Set: T:\...\OW 10 ft_S = 0.1_ Rate=3 GPM_Recovery at 10 hrs
Date: 04/10/13 Time: 17:06:04

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 1400. ft^2/day
S = 0.1
Kz/Kr = 1.
b = 20. ft

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
PW	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ PW	0	0
□ OW	10	0

Data Set: T:\2001\M01046 Michigan Meadows Apts\VC in Residential Wells_Allison Issue\Weston Jan 30 2013 Report EPA\MUNDELL Response Files
Date: 04/10/13
Time: 17:00:18

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO

AQUIFER DATA

Saturated Thickness: 20. ft
Anisotropy Ratio (Kz/Kr): 1.

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: PW

X Location: 0. ft
Y Location: 0. ft

Casing Radius: 0.1 ft
Well Radius: 0.25 ft

Fully Penetrating Well

No. of pumping periods: 2

Pumping Period Data

Time (min)	Rate (gal/min)	Time (min)	Rate (gal/min)
0.	3.	600.	0.

OBSERVATION WELL DATA

No. of observation wells: 2

Observation Well No. 1: PW

X Location: 0. ft
Y Location: 0. ft

Radial distance from PW: 0. ft

Fully Penetrating Well

No. of Observations: 0

Observation Well No. 2: OW

X Location: 10. ft
Y Location: 0. ft

Radial distance from PW: 10. ft

Fully Penetrating Well

No. of Observations: 0

SOLUTION

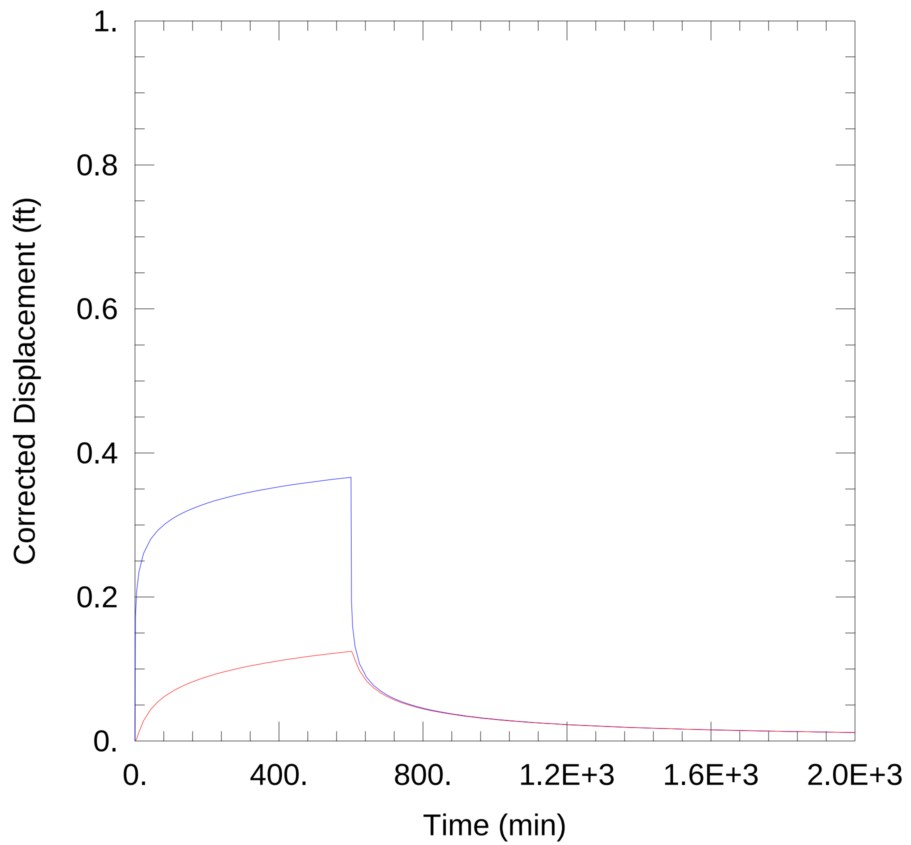
Pumping Test
Aquifer Model: Unconfined
Solution Method: Theis

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	1400.	ft^2/day
S	0.1	
Kz/Kr	1.	
b	20.	ft

K = T/b = 70. ft/day (0.02469 cm/sec)
Ss = S/b = 0.005 1/ft



WELL TEST ANALYSIS

Data Set: T:\...\OW 10 ft_S = 0.3_ Rate=3 GPM_Recovery at 10 hrs
Date: 04/10/13 Time: 17:06:26

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 1400. ft^2/day
S = 0.3
Kz/Kr = 1.
b = 20. ft

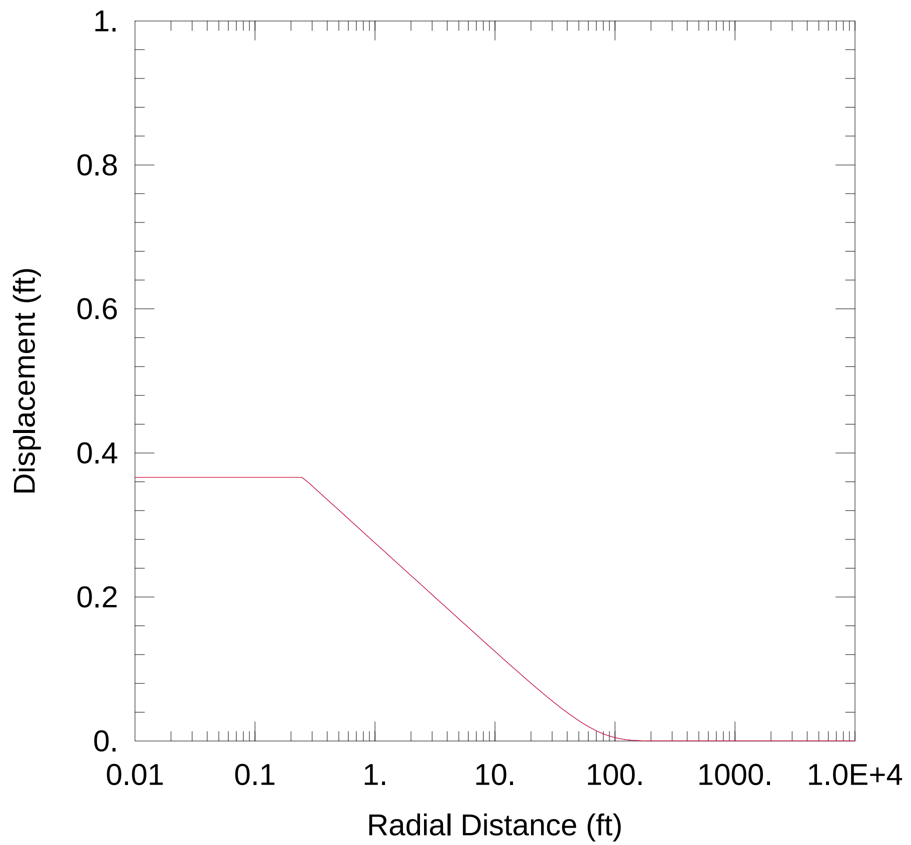
WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
PW	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ PW	0	0
□ OW	10	0



WELL TEST ANALYSIS

Data Set: T:\...\OW 10 ft_S = 0.3_ Rate=3 GPM_Recovery at 10 hrs
Date: 04/10/13 Time: 17:06:43

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 1400. ft^2/day
S = 0.3
Kz/Kr = 1.
b = 20. ft

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
PW	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ PW	0	0
□ OW	10	0

Data Set: T:\2001\M01046 Michigan Meadows Apts\VC in Residential Wells_Allison Issue\Weston Jan 30 2013 Report EPA\MUNDELL Response Files
Date: 04/10/13
Time: 16:59:22

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO

AQUIFER DATA

Saturated Thickness: 20. ft
Anisotropy Ratio (Kz/Kr): 1.

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: PW

X Location: 0. ft
Y Location: 0. ft

Casing Radius: 0.1 ft
Well Radius: 0.25 ft

Fully Penetrating Well

No. of pumping periods: 2

Pumping Period Data

Time (min)	Rate (gal/min)	Time (min)	Rate (gal/min)
0.	3.	600.	0.

OBSERVATION WELL DATA

No. of observation wells: 2

Observation Well No. 1: PW

X Location: 0. ft
Y Location: 0. ft

Radial distance from PW: 0. ft

Fully Penetrating Well

No. of Observations: 0

Observation Well No. 2: OW

X Location: 10. ft
Y Location: 0. ft

Radial distance from PW: 10. ft

Fully Penetrating Well

No. of Observations: 0

SOLUTION

Pumping Test
Aquifer Model: Unconfined
Solution Method: Theis

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	1400.	ft^2/day
S	0.3	
Kz/Kr	1.	
b	20.	ft

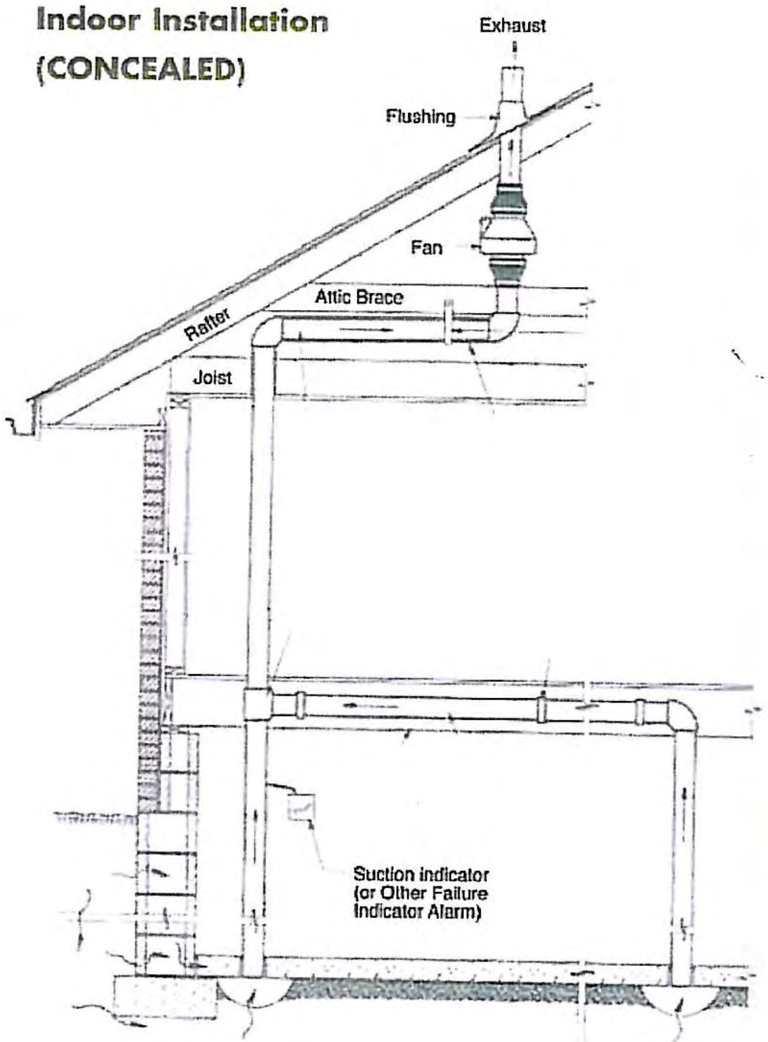
K = T/b = 70. ft/day (0.02469 cm/sec)
Ss = S/b = 0.015 1/ft

APPENDIX L

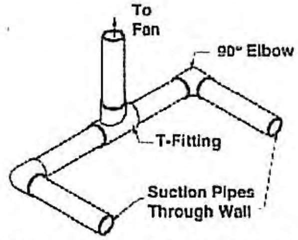
MITIGATION SYSTEM DOCUMENTATION

Sub-Slab Application Schematics

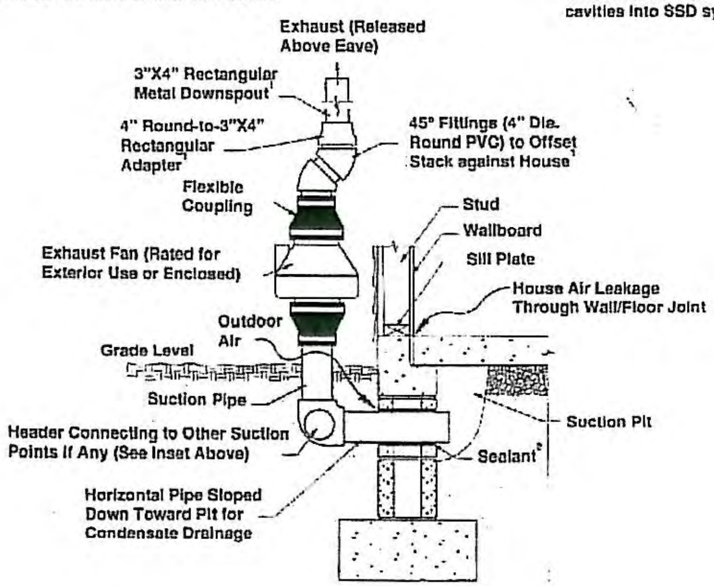
Sub-slab depressurization (SSD) system:
using pipes inserted down through the slab from <u>indoors</u>



Sub-slab depressurization (SSD) system:
using pipes inserted horizontally through the foundation wall from outdoors



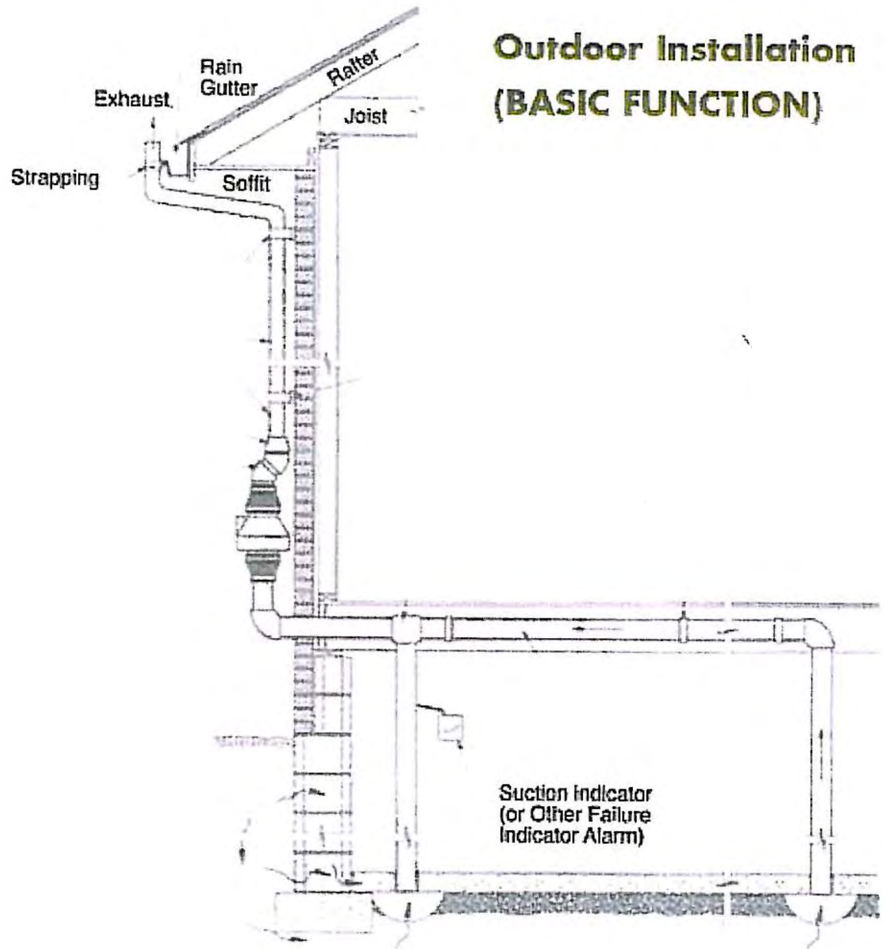
One possible configuration for a multi-pipe system

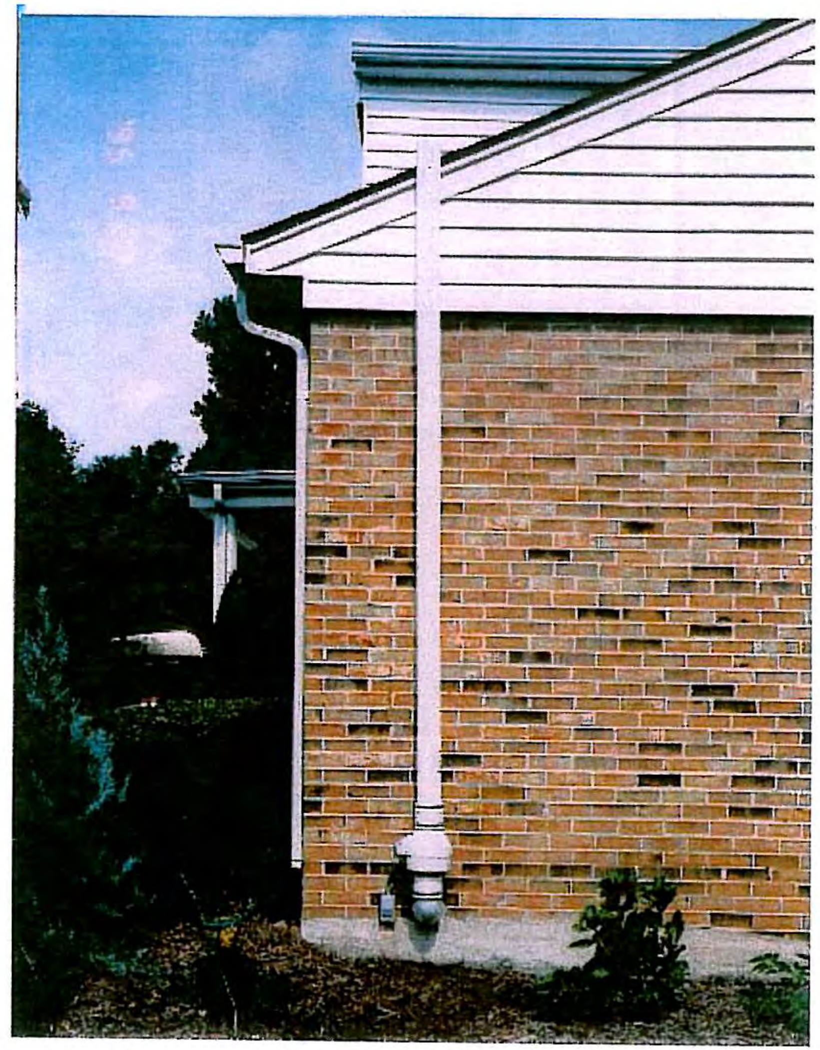


Notes:

1. The exterior downspout exhaust stack illustrated here is one of several possible stack configurations, as discussed later.
2. Sealing pipe penetration through wall is important to reduce leakage of outdoor air and air from block cavities into SSD system.

Sub-slab depressurization (SSD) system:
using pipes inserted down through the slab from indoors





Plaza Mitigation System Schematic
(Typical of the 4 Units)

Michigan Plaza Indoor Air Mitigation
Sub-slab depressurization (SSD) system:

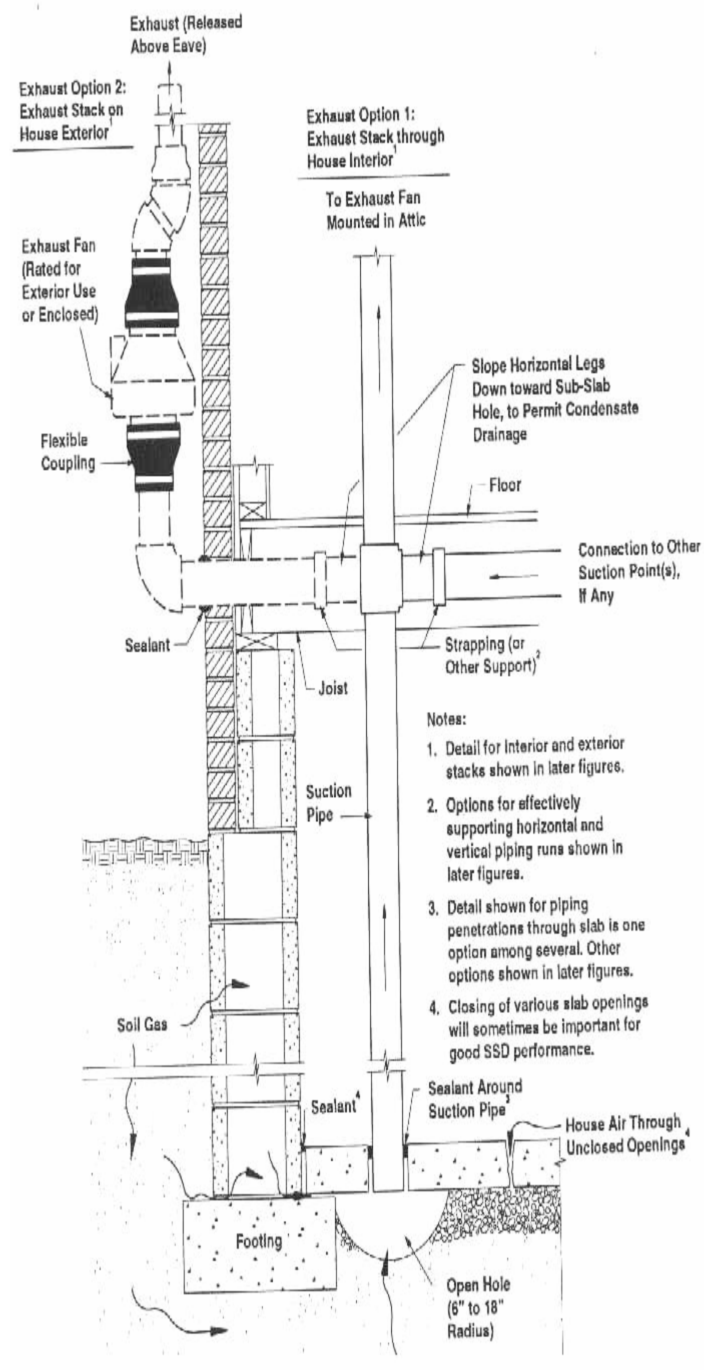
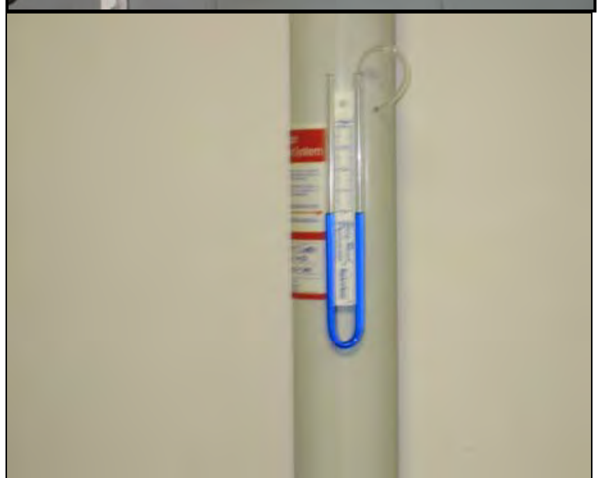


Figure 1. Sub-slab depressurization (SSD) using pipes inserted down through the slab from indoors

8



System Installation Photographs

Photo 1: Coring into the slab (3819)

Photo 2: The coring process (3819)

Photo 3: The sub-slab pea-gravel (3819)

Photo 4: The plastic suction pipe with the U-tube manometer (3819)

Photo 5: Suction point in the 3819 space

Photo 6: The blower (RP 145) on the 3819 outside wall

Photo 7: Piping inside the building

Photo 8: More piping

Photo 9: Piping proceeding outside through the wall

Photo 10: The unit with the suction point inside the handicap work shop

Photo 11: The manometer (static pressure reading / space 3815)

Operations & Maintenance Checklists

Michigan Meadows O&M Checklist B - _____

Time On Site: ______________ a.m. / p.m.

Time Off Site:______________ a.m. / p.m.

Date: ________________

Inspector: ____________

Readings:

System   ON / OFF   at arrival

Static pressure reading (U-tube manometer)________________ inches of water

Air flow ________________ cfm

PID reading ________________ ppm

Comments:

____

____

____

____

____

____

____

CFM Vs Static Pressure “WC” for RP 145 Fan

0”	0.25”	0.5”	0.75”	1.0”	1.25”	1.5”	1.75”	2.0”
173	152	132	115	94	73	55	37	-

Michigan Plaza Indoor Air Mitigation System O&M Checklist

Time On Site: ______________ a.m. / p.m. Date: ________________

Time Off Site:______________ a.m. / p.m. Inspector: ____________

Readings:

System	ON / OFF at arrival	Time
B-1	________________	________________
B-2	________________	________________
B-3	________________	________________
B-4	________________	________________

Static pressure reading (U-tube manometer)

B-1________________ psi
B-2________________ psi
B-3________________ psi
B-4________________ psi

Air flow

B-1 ________________ cfm
B-2________________ cfm
B-3________________ cfm
B-4________________ cfm

PID reading

B-1________________ ppm
B-2________________ ppm
B-3________________ ppm
B-4________________ ppm

Comments:

APPENDIX M

MITIGATION SYSTEM CVOC VOLUMES REMOVED

Lab Data for Air Mitigation System B-1
Second Quarter 2013
5/22/2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

B-1 (Lab Data)

Sample Date	Hours per Cycle	Average Flow Rate (CFM)	Air Vol. Removed per Cycle (CF)	µg/m3 PCE	Lbs. PCE removed	µg/m3 TCE	Lbs. TCE removed	µg/m3 VC	Lbs. VC removed	µg/m3 cis-1,2-DCE	Lbs. cis-1,2-DCE removed	Lbs. Total Pollutants Removed (ug/m3)	Cumulative PCE lbs Removed	Cumulative Total Pollutant lbs Removed
9/21/2006	0.5	73	2,190	4,281	0.00	129	0.00	38	0.00	556	0.00	0.00	0.00	0.00
10/6/2006	360	73	1,576,800	5,980	0.59	65	0.01	38	0.00	119	0.01	0.61	0.59	0.61
10/13/2006	168	73	735,840	4,621	0.21	27	0.00	38	0.00	40	0.00	0.22	0.80	0.83
10/20/2006	168	73	735,840	5,913	0.27	27	0.00	38	0.00	40	0.00	0.28	1.07	1.10
11/17/2006	672	73	2,943,360	5,505	1.01	27	0.00	38	0.01	40	0.01	1.03	2.08	2.13
12/27/2006	960	73	4,204,800	5,029	1.32	27	0.01	38	0.01	95	0.03	1.36	3.40	3.50
3/30/2007	2,232	73	9,776,160	3,466	2.11	27	0.02	38	0.02	40	0.02	2.18	5.52	5.67
6/15/2007	1,848	73	8,094,240	34	0.02	2,477	1.25	38	0.02	834	0.42	1.71	5.53	7.38
10/16/2007	2,952	73	12,929,760	2,650	2.14	27	0.02	38	0.03	40	0.03	2.22	7.67	9.60
12/14/2007	1,416	73	6,202,080	3,942	1.52	27	0.01	38	0.01	40	0.02	1.57	9.20	11.17
3/27/2008	2,496	73	10,932,480	3,738	2.55	27	0.02	38	0.03	135	0.09	2.69	11.74	13.86
6/2/2008	1,608	73	7,043,040	4,893	2.15	27	0.01	38	0.02	40	0.02	2.20	13.89	16.05
9/12/2008	2,448	73	10,722,240	3,262	2.18	27	0.02	38	0.03	40	0.03	2.25	16.08	18.30
11/26/2008	1,800	73	7,884,000	3,126	1.54	27	0.01	38	0.02	40	0.02	1.59	17.61	19.89
3/24/2009	2,832	73	12,404,160	3,058	2.37	27	0.02	38	0.03	40	0.03	2.45	19.98	22.34
6/15/2009	1,992	73	8,724,960	2,922	1.59	27	0.01	38	0.02	40	0.02	1.65	21.57	23.99
8/21/2009	1,608	73	7,043,040	2,447	1.07	27	0.01	38	0.02	40	0.02	1.12	22.65	25.11
11/5/2009	1,824	73	7,989,120	2,243	1.12	27	0.01	38	0.02	40	0.02	1.17	23.76	26.28
2/5/2010	2,208	73	9,671,040	1,087	0.66	27	0.02	38	0.02	40	0.02	0.72	24.42	27.00
4/23/2010	1,848	55	6,098,400	883	0.34	27	0.01	38	0.01	40	0.02	0.38	24.75	27.37
7/23/2010	2,184	55	7,207,200	1,019	0.46	27	0.01	38	0.02	40	0.02	0.51	25.21	27.88
10/15/2010	2,016	73	8,830,080	639	0.35	27	0.01	38	0.02	40	0.02	0.41	25.57	28.29
1/21/2011	2,352	55	7,761,600	951	0.46	27	0.01	38	0.02	40	0.02	0.51	26.03	28.80
5/11/2011	2,640	73	11,563,200	1,495	1.08	27	0.02	38	0.03	40	0.03	1.15	27.10	29.95
7/29/2011	1,896	73	8,304,480	449	0.23	27	0.01	38	0.02	40	0.02	0.29	27.34	30.24
10/25/2011	2,112	55	6,969,600	748	0.33	27	0.01	38	0.02	40	0.02	0.37	27.66	30.61
1/20/2012	2,088	55	6,890,400	680	0.29	27	0.01	512	0.22	40	0.02	0.54	27.95	31.15
6/15/2012	3,528	55	11,642,400	483	0.35	7	0.01	38	0.03	40	0.03	0.41	28.30	31.57
9/25/2012	2,448	73	10,722,240	680	0.45	7	0.00	38	0.03	40	0.03	0.51	28.76	32.08
12/31/2012	2,328	73	10,196,640	1,631	1.04	11	0.01	845	0.54	40	0.03	1.61	29.80	33.68
3/20/2013	1,896	132	15,016,320	1,563	1.46	11	0.01	512	0.48	40	0.04	1.99	31.26	35.68
5/22/2013	1,512	73	6,622,560	1,699	0.70	11	0.00	256	0.11	40	0.02	0.83	31.96	36.50
TOTALS:	**58,441**		**247,440,270**		**31.96**		**1.60**		**1.84**		**1.10**	**36.50**		

B-1 (PID Readings)

Sample Date	Hours Per Cycle	Average Flow Rate (CFM)	Air Vol. Removed per Cycle (CF)	PID Reading (ppm VOCs)	µg/m3 VOCs	Lbs. VOCs Removed	Cum Total lbs Removed (Est from PID)
11/17/2006	672	73	2,943,360	0.1	1,483	0.27	0.27
12/27/2006	960	73	4,204,800	0.0	1,296	0.34	0.61
6/15/2007	4,080	73	17,870,400	0.1	1,483	1.65	2.26
10/16/2007	2,952	73	12,929,760	0.1	1,483	1.20	3.46
12/14/2007	1,416	73	6,202,080	0.1	1,483	0.57	4.03
6/2/2008	4,104	73	17,975,520	2.2	5,401	6.06	10.09
9/12/2008	2,448	73	10,722,240	0.3	1,856	1.24	11.33
11/26/2008	1,800	73	7,884,000	0.1	1,483	0.73	12.06
8/21/2009	6,432	73	28,172,160	3.8	8,387	14.74	26.80
11/5/2009	1,824	73	7,989,120	2.1	5,215	2.60	29.40
2/5/2010	2,208	73	9,671,040	2.3	5,588	3.37	32.77
5/6/2010	2,160	55	7,128,000	2.2	5,401	2.40	35.17
10/15/2010	3,888	73	17,029,440	2.0	5,028	5.34	40.51
1/21/2011	2,352	55	7,761,600	1.9	4,841	2.34	42.86
5/11/2011	2,640	73	11,563,200	1.9	4,841	3.49	46.35
7/29/2011	1,896	73	8,304,480	1.1	3,349	1.73	48.08
10/25/2011	2,112	55	6,969,600	2.1	5,215	2.27	50.35
1/20/2012	2,088	55	6,890,400	1.7	4,468	1.92	52.27
6/15/2012	3,528	55	11,642,400	2.4	5,774	4.19	56.46
9/25/2012	2,448	73	10,722,240	2.5	5,961	3.99	60.45
12/31/2012	2,328	73	10,196,640	0.3	1,856	1.18	61.63
3/20/2013	1,896	132	15,016,320	0.1	1,483	1.39	63.02
5/22/2013	1,512	73	6,622,560	0.0	1,296	0.54	63.56
TOTALS:	**57,072**		**243,468,000**			**63.28**	

Lab Data for Air Mitigation System B-2
Second Quarter 2013
5/22/2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

B-2 (Lab Data)

Sample Date	Hours per Cycle	Average Flow Rate (CFM)	Air Vol. Removed per Cycle (CF)	µg/m3 PCE	Lbs. PCE removed	µg/m3 TCE	Lbs. TCE removed	µg/m3 VC	Lbs. VC removed	µg/m3 cis-1,2-DCE	Lbs. cis-1,2-DCE removed	Lbs. Total Pollutants Removed	Cumulative PCE lbs Removed	Cumulative Total Pollutant lbs Removed
9/21/2006	0.5	37	1,110	5,369	0.00	65	0.00	38	0.00	40	0.00	0.00	0.00	0.00
10/6/2006	360	37	799,200	4,553	0.23	27	0.00	38	0.00	40	0.00	0.23	0.23	0.23
10/13/2006	168	37	372,960	2,447	0.06	27	0.00	38	0.00	40	0.00	0.06	0.28	0.29
10/20/2006	168	37	372,960	3,738	0.09	27	0.00	38	0.00	40	0.00	0.09	0.37	0.38
11/17/2006	672	37	1,491,840	3,194	0.30	27	0.00	38	0.00	40	0.00	0.31	0.67	0.69
12/27/2006	960	37	2,131,200	3,194	0.42	27	0.00	38	0.01	40	0.01	0.44	1.09	1.13
3/30/2007	2,232	38	5,088,960	1,223	0.39	27	0.01	38	0.01	40	0.01	0.42	1.48	1.55
6/15/2007	1,848	42	4,656,960	2,107	0.61	27	0.01	38	0.01	40	0.01	0.64	2.09	2.19
10/16/2007	2,952	48	8,501,760	1,631	0.86	27	0.01	38	0.02	40	0.02	0.92	2.96	3.11
12/14/2007	1,416	53	4,502,880	2,311	0.65	27	0.01	38	0.01	40	0.01	0.68	3.61	3.79
4/1/2008	2,616	50	7,848,000	2,447	1.20	27	0.01	38	0.02	40	0.02	1.25	4.81	5.04
6/2/2008	1,488	42	3,705,120	3,806	0.88	27	0.01	38	0.01	40	0.01	0.90	5.68	5.94
9/12/2008	2,448	37	5,434,560	3,194	1.08	27	0.01	38	0.01	40	0.01	1.12	6.77	7.06
8/21/2009	1,440	37	3,196,800	1,087	0.22	27	0.01	38	0.01	40	0.01	0.24	6.98	7.30
11/5/2009	1,824	37	4,049,280	951	0.24	27	0.01	38	0.01	40	0.01	0.27	7.22	7.57
2/5/2010	2,208	55	7,286,400	251	0.11	27	0.01	38	0.02	40	0.02	0.16	7.34	7.73
5/6/2010	2,160	37	4,795,200	1,019	0.30	27	0.01	38	0.01	40	0.01	0.34	7.64	8.06
7/23/2010	1,872	37	4,155,840	1,291	0.33	27	0.01	38	0.01	40	0.01	0.36	7.98	8.43
10/15/2010	2,016	55	6,652,800	442	0.18	27	0.01	38	0.02	40	0.02	0.23	8.16	8.65
1/21/2011	2,352	55	7,761,600	183	0.09	27	0.01	38	0.02	40	0.02	0.14	8.25	8.79
5/11/2011	2,640	37	5,860,800	1,835	0.67	27	0.01	38	0.01	40	0.01	0.71	8.92	9.50
7/29/2011	1,896	37	4,209,120	1,155	0.30	27	0.01	38	0.01	40	0.01	0.33	9.23	9.83
10/25/2011	2,112	37	4,688,640	816	0.24	27	0.01	38	0.01	40	0.01	0.27	9.16	10.10
1/20/2012	2,088	37	4,635,360	550	0.16	27	0.01	282	0.08	40	0.01	0.26	9.38	10.36
6/15/2012	3,528	37	7,832,160	816	0.40	6	0.00	38	0.02	40	0.02	0.44	9.56	10.80
9/25/2012	2,448	37	5,434,560	1,223	0.41	9	0.00	38	0.01	40	0.01	0.44	9.80	11.25
12/31/2012	2,328	55	7,682,400	1,291	0.62	10	0.00	4,098	1.96	40	0.02	2.61	10.18	13.85
3/20/2013	1,896	115	13,082,400	1,359	1.11	9	0.01	538	0.44	40	0.03	1.59	10.91	15.44
5/22/2013	1,512	37	3,356,640	3,126	0.65	15	0.00	38	0.01	40	0.01	0.67	10.83	16.12
TOTALS:	**51,649**		**139,587,510**		**12.82**		**0.19**		**2.76**		**0.35**	**16.12**		

B-2 (PID Readings)

Sample Date	Hours Per Cycle	Average Flow Rate (CFM)	Air Vol. Removed per Cycle (CF)	PID Reading (ppm VOCs)	µg/m3 VOCs	Lbs. VOCs Removed	Cum Total lbs Removed (Est from PID)
11/17/2006	672.0	37	1,491,840	0.1	1,483	0.14	0.14
12/27/2006	960	37	2,131,200	0.1	1,483	0.20	0.34
6/15/2007	4,080	37	9,057,600	0.1	1,483	0.84	1.17
10/16/2007	2,952	37	6,553,440	0.1	1,483	0.61	1.78
12/14/2007	1,416	55	4,672,800	0.1	1,483	0.43	2.21
6/2/2008	4,104	132	32,503,680	1.5	4,095	8.30	10.51
9/12/2008	2,448	37	5,434,560	0.5	2,229	0.76	11.27
8/21/2009	8,232	55	27,165,600	2.4	5,774	9.79	21.05
11/5/2009	1,824	94	10,287,360	1.6	4,282	2.75	23.80
2/5/2010	2,208	55	7,286,400	0.6	2,416	1.10	24.90
5/6/2010	2,160	37	4,795,200	1.4	3,908	1.17	26.07
10/15/2010	3,888	55	12,830,400	3.2	7,267	5.82	31.89
1/21/2011	2,352	55	7,761,600	1.4	3,908	1.89	33.78
5/11/2011	2,640	37	5,860,800	1.6	4,282	1.57	35.34
7/29/2011	1,896	37	4,209,120	1.7	4,468	1.2	36.52
10/25/2011	2,112	37	4,688,640	1.9	4,841	1.4	37.93
1/20/2012	2,088	37	4,635,360	1.5	4,095	1.2	39.12
6/15/2012	3,528	37	7,832,160	2.8	6,521	3.2	42.30
9/25/2012	2,448	37	5,434,560	2.9	6,707	2.3	44.58
12/31/2012	2,328	55	7,682,400	4.3	9,320	4.5	49.04
3/20/2013	1,896	115	13,082,400	1.4	3,908	3.2	52.23
5/22/2013	1,512	37	3,356,640	0.2	1,669	0.3	52.58
TOTALS:	**57,072**		**187,261,920**			**52.44**	

Lab Data for Air Mitigation System B-3
Second Quarter 2013
5/22/2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

B-3 (Lab Data)															
Sample Date	Hours per Cycle	Average Flow Rate (CFM)	Air Vol. Removed per Cycle (CF)	µg/m3 PCE	Lbs. PCE removed	µg/m3 TCE	Lbs. TCE removed	µg/m3 VC	Lbs. VC removed	µg/m3 cis-1,2-DCE	Lbs. cis-1,2-DCE removed	Lbs. Total Pollutants Removed	Cumulative PCE lbs Removed	Cumulative Total Pollutant lbs Removed
9/21/2006	0.5	132	3,960	4,553	0.00	27	0.00	38	0.00	40	0.00	0.00	0.00	0.00
10/6/2006	360	132	2,851,200	6,592	1.17	27	0.00	38	0.01	40	0.01	1.19	1.17	1.19
10/13/2006	168	132	1,330,560	3,534	0.29	27	0.00	38	0.00	40	0.00	0.30	1.47	1.49
10/20/2006	168	132	1,330,560	6,048	0.50	27	0.00	38	0.00	40	0.00	0.51	1.97	2.01
11/17/2006	672	132	5,322,240	5,301	1.76	27	0.01	38	0.01	40	0.01	1.79	3.73	3.80
12/27/2006	960	132	7,603,200	5,097	2.42	27	0.01	38	0.02	40	0.02	2.47	6.15	6.27
3/30/2007	2,232	132	17,677,440	3,874	4.27	27	0.03	38	0.04	40	0.04	4.39	10.42	10.65
6/15/2007	1,848	132	14,636,160	1,427	1.30	27	0.02	38	0.04	40	0.04	1.40	11.72	12.05
10/16/2007	2,952	132	23,379,840	1,903	2.78	27	0.04	38	0.06	40	0.06	2.93	14.50	14.98
12/14/2007	1,416	132	11,214,720	3,534	2.47	27	0.02	38	0.03	40	0.03	2.55	16.97	17.53
3/27/2008	2,496	132	19,768,320	3,806	4.69	27	0.03	38	0.05	40	0.05	4.82	21.66	22.35
6/2/2008	1,608	55	5,306,400	3,330	1.10	27	0.01	38	0.01	40	0.01	1.14	22.76	23.49
9/12/2008	2,448	132	19,388,160	3,602	4.36	27	0.03	38	0.05	40	0.05	4.48	27.12	27.97
11/26/2008	1,800	132	14,256,000	2,447	2.18	27	0.02	38	0.03	40	0.04	2.27	29.30	30.24
3/24/2009	2,832	132	22,429,440	3,738	5.23	27	0.04	38	0.05	40	0.06	5.38	34.52	35.62
6/15/2009	1,992	132	15,776,640	2,854	2.81	27	0.03	38	0.04	40	0.04	2.91	37.33	38.53
8/21/2009	1,608	132	12,735,360	3,194	2.54	27	0.02	38	0.03	40	0.03	2.62	39.87	41.15
11/5/2009	1,824	132	14,446,080	2,786	2.51	27	0.02	38	0.03	40	0.04	2.61	42.38	43.75
2/5/2010	2,208	132	17,487,360	951.44	1.04	26.93	0.03	38	0.04	40	0.04	1.15	43.42	44.91
5/6/2010	2,160	132	17,107,200	1,699	1.81	27	0.03	38	0.04	40	0.04	1.93	45.23	46.83
7/23/2010	1,872	132	14,826,240	816	0.75	27	0.02	38	0.04	40	0.04	0.85	45.99	47.68
10/15/2010	2,016	132	15,966,720	34	0.03	27	0.03	38	0.04	40	0.04	0.14	46.02	47.82
1/21/2011	2,352	132	18,627,840	NS	0.00	NS	0.00	NS	0.00	NS	0.00	0.00	46.02	47.82
4/8/2011	1,848	132	14,636,160	1,427	1.30	27	0.02	38	0.04	199	0.18	1.54	47.32	49.37
5/11/2011	792	132	6,272,640	1,427	0.56	27	0.01	38	0.02	40	0.02	0.60	47.88	49.97
7/29/2011	1,896	132	15,016,320	748	0.70	27	0.03	38	0.04	40	0.04	0.80	48.58	50.76
10/25/2011	2,112	132	16,727,040	360	0.38	27	0.03	38	0.04	40	0.04	0.49	48.96	51.25
1/20/2012	2,088	55	6,890,400	449	0.19	6	0.00	38	0.02	40	0.02	0.23	49.15	51.48
6/15/2012	3,528	132	27,941,760	326	0.57	27	0.05	38	0.07	40	0.07	0.75	49.72	52.23
9/25/2012	2,448	132	19,388,160	598	0.72	10	0.01	359	0.43	40	0.05	1.22	50.44	53.45
12/31/2012	2,328	132	18,437,760	951	1.09	15	0.02	589	0.68	40	0.05	1.83	51.54	55.28
3/20/2013	1,896	132	15,016,320	625	0.59	12	0.01	246	0.23	40	0.04	0.86	52.12	56.15
5/22/2013	1,512	132	11,975,040	1,019	0.76	16	0.01	38	0.03	40	0.03	0.83	52.88	56.98
TOTALS:	**58,441**		**445,773,240**		**52.88**		**0.65**		**2.24**		**1.20**	**56.98**		

B-3 (PID Readings)							
Sample Date	Hours Per Cycle	Average Flow Rate (CFM)	Air Vol. Removed per Cycle (CF)	PID Reading (ppm VOCs)	µg/m3 VOCs	Lbs. VOCs Removed	Cum Total lbs Removed (Est from PID)
11/17/2006	672	132	5,322,240	2.0	5,028	1.67	1.67
12/27/2006	960	132	7,603,200	0.1	1,483	0.70	2.37
6/15/2007	4,080	132	32,313,600	0.1	1,483	2.99	5.36
10/16/2007	2,952	132	23,379,840	0.1	1,483	2.16	7.52
12/14/2007	1,416	132	11,214,720	0.1	1,483	1.04	8.56
6/2/2008	4,104	55	13,543,200	1.2	3,535	2.99	11.55
9/12/2008	2,448	132	19,388,160	0.5	2,229	2.70	14.24
11/26/2008	1,800	132	14,256,000	0.8	2,789	2.48	16.72
8/21/2009	6,432	132	50,941,440	0.0	1,296	4.12	20.84
11/5/2009	1,824	132	14,446,080	1.8	4,655	4.19	25.04
2/5/2010	2,208	132	17,487,360	1.5	4,095	4.47	29.50
5/6/2010	2,160	132	17,107,200	1.7	4,468	4.77	34.27
10/15/2010	3,888	132	30,792,960	0.1	1,483	2.85	37.12
1/21/2011	2,352	132	18,627,840	1.4	3,908	4.54	41.66
4/8/2011	1,848	132	14,636,160	2.4	5,774	5.27	46.93
5/11/2011	792	132	6,272,640	1.2	3,535	1.38	48.32
7/29/2011	1,896	132	15,016,320	1.3	3,722	3.5	51.80
10/25/2011	2,112	132	16,727,040	1.5	4,095	4.3	56.07
1/20/2012	2,088	55	6,890,400	1.4	3,908	1.7	57.75
6/15/2012	3,528	132	27,941,760	1.4	3,908	6.8	64.57
9/25/2012	2,448	132	19,388,160	1.5	4,095	5.0	69.52
12/31/2012	2,328	132	18,437,760	0.6	2,416	2.8	72.30
3/20/2013	1,896	132	15,016,320	0.1	1,483	1.4	73.69
5/22/2013	1,512	132	11,975,040	0.0	1,296	1.0	74.65
TOTALS:	**57,072**		**423,403,200**			**72.98**	

Lab Data for Air Mitigation System B-4
Second Quarter 2013
5/22/2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

B-4 (Lab Data)														
Sample Date	Hours per Cycle	Average Flow Rate (CFM)	Air Vol. Removed per Cycle (CF)	µg/m3 PCE	Lbs. PCE removed	µg/m3 TCE	Lbs. TCE removed	µg/m3 VC	Lbs. VC removed	µg/m3 cis-1,2-DCE	Lbs. cis-1,2-DCE removed	Lbs. Total Pollutants Removed	Cumulative PCE lbs Removed	Cumulative Total Pollutant lbs Removed
9/21/2006	0.5	132	3,960	1,903	0.00	27	0.00	38	0.00	40	0.00	0.00	0.00	0.00
10/6/2006	360	132	2,851,200	2,107	0.37	27	0.00	38	0.01	40	0.01	0.39	0.38	0.39
10/13/2006	168	132	1,330,560	1,427	0.12	27	0.00	38	0.00	40	0.00	0.13	0.49	0.52
10/20/2006	168	132	1,330,560	1,495	0.12	27	0.00	38	0.00	40	0.00	0.13	0.62	0.65
11/17/2006	672	132	5,322,240	1,019	0.34	27	0.01	38	0.01	40	0.01	0.37	0.96	1.03
12/27/2006	960	132	7,603,200	748	0.35	27	0.01	38	0.02	40	0.02	0.40	1.31	1.43
3/30/2007	2,232	130	17,342,640	211	0.23	27	0.03	38	0.04	40	0.04	0.34	1.54	1.77
6/15/2007	1,848	125	13,887,720	3,126	2.71	27	0.02	38	0.03	40	0.03	2.80	4.25	4.57
10/16/2007	2,952	128	22,627,080	455	0.64	27	0.04	38	0.05	40	0.06	0.79	4.89	5.36
12/14/2007	1,416	132	11,214,720	951	0.67	27	0.02	38	0.03	40	0.03	0.74	5.56	6.10
3/27/2008	2,496	128	19,094,400	503	0.60	27	0.03	38	0.05	40	0.05	0.72	6.15	6.83
6/2/2008	1,608	119	11,481,120	680	0.49	27	0.02	38	0.03	40	0.03	0.56	6.64	7.39
9/12/2008	2,448	132	19,388,160	883	1.07	27	0.03	38	0.05	40	0.05	1.20	7.71	8.58
11/26/2008	1,800	132	14,256,000	748	0.66	27	0.02	38	0.03	40	0.04	0.76	8.37	9.34
3/24/2009	2,832	132	22,429,440	34	0.05	27	0.04	38	0.05	40	0.06	0.19	8.42	9.54
6/15/2009	1,992	132	15,776,640	136	0.13	27	0.03	38	0.04	40	0.04	0.24	8.56	9.77
8/21/2009	1,608	132	12,735,360	95	0.08	27	0.02	38	0.03	40	0.03	0.16	8.63	9.93
11/5/2009	1,824	132	14,446,080	34	0.03	27	0.02	38	0.03	40	0.04	0.13	8.66	10.06
2/5/2010	2,208	132	17,487,360	82	0.09	27	0.03	38	0.04	40	0.04	0.20	8.75	10.26
4/23/2010	1,848	115	12,751,200	116	0.09	27	0.02	38	0.03	40	0.03	0.18	8.84	10.44
7/23/2010	2,184	115	15,069,600	34	0.03	27	0.03	38	0.04	40	0.04	0.13	8.87	10.57
10/13/2010	1,968	115	13,579,200	34	0.03	27	0.02	38	0.03	40	0.03	0.12	8.90	10.69
1/21/2011	2,400	132	19,008,000	34	0.04	27	0.03	38	0.05	40	0.05	0.16	8.94	10.85
5/11/2011	2,640	132	20,908,800	156	0.20	27	0.04	38	0.05	40	0.05	0.34	9.15	11.19
7/29/2011	1,896	115	13,082,400	34	0.03	27	0.02	38	0.03	40	0.03	0.11	9.18	11.31
10/25/2011	2,112	132	16,727,040	34	0.04	27	0.03	38	0.04	40	0.04	0.15	9.21	11.45
1/20/2012	2,088	132	16,536,960	55	0.06	27	0.03	38	0.04	40	0.04	0.17	9.27	11.62
6/15/2012	3,528	115	24,343,200	31	0.05	27	0.04	38	0.06	40	0.06	0.21	9.31	11.82
9/25/2012	2,448	132	19,388,160	7	0.01	27	0.03	256	0.31	40	0.05	0.40	9.32	12.22
12/31/2012	2,328	132	18,437,760	13	0.01	27	0.03	38	0.04	40	0.05	0.14	9.34	12.36
3/20/2013	1,896	132	15,016,320	82	0.08	27	0.03	38	0.04	40	0.04	0.17	9.41	12.53
5/22/2013	1,512	115	10,432,800	136	0.09	27	0.02	38	0.02	40	0.03	0.16	9.50	12.69
TOTALS:	**58,441**		**445,889,880**		**9.50**		**0.75**		**1.33**		**1.11**	**12.69**		

B-4 (PID Readings)							
Sample Date	Hours Per Cycle	Average Flow Rate (CFM)	Air Vol. Removed per Cycle (CF)	PID Reading (ppm VOCs)	µg/m3 VOCs	Lbs. VOCs Removed	Cum Total lbs Removed (Est from PID)
11/17/2006	672	132	5,322,240	0.1	1,483	0.49	0.49
12/27/2006	960	132	7,603,200	0.1	1,483	0.70	1.20
6/15/2007	4,080	132	32,313,600	0.1	1,483	2.99	4.18
10/16/2007	2,952	132	23,379,840	0.1	1,483	2.16	6.35
12/14/2007	1,416	132	11,214,720	0.1	1,483	1.04	7.38
3/29/2008	2,544	132	20,148,480	1.8	4,655	5.85	13.23
6/2/2008	1,560	132	12,355,200	0.3	1,856	1.43	14.66
9/12/2008	2,448	132	19,388,160	0.4	2,042	2.47	17.13
11/26/2008	1,800	132	14,256,000	0.1	1,483	1.32	18.45
8/21/2009	6,432	115	44,380,800	0.0	1,296	3.59	22.04
11/6/2009	1,848	132	14,636,160	0.4	2,042	1.86	23.90
2/5/2010	2,184	132	17,297,280	0.6	2,416	2.61	26.51
4/23/2010	1,848	115	12,751,200	0.9	2,975	2.37	28.88
10/15/2010	4,200	115	28,980,000	0.5	2,229	4.03	32.91
1/21/2011	2,352	132	18,627,840	0.2	1,669	1.94	34.85
5/11/2011	2,640	132	20,908,800	0.1	1,483	1.93	36.78
7/29/2011	1,896	115	13,082,400	0.4	2,042	1.7	38.45
10/25/2011	2,112	132	16,727,040	0.5	2,229	2.3	40.77
1/20/2012	2,088	132	16,536,960	0.4	2,042	2.1	42.88
6/15/2012	3,528	115	24,343,200	0.2	1,669	2.5	45.41
9/25/2012	2,448	132	19,388,160	0.3	1,856	2.2	47.66
12/31/2012	2,328	132	18,437,760	0.1	1,483	1.7	49.36
3/20/2013	1,896	132	15,016,320	0.0	1,296	1.2	50.58
5/22/2013	1,512	115	10,432,800	0.0	1,296	0.8	51.42
TOTALS:	**57,072**		**432,205,920**			**50.93**	

Lab Data for Air Mitigation System B-5
Second Quarter 2013
6/19/2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

B-5 (Lab Data)

Sample Date	Hours per Cycle	Average Flow Rate (CFM)	Air Vol. Removed per Cycle (CF)	µg/m3 PCE	Lbs. PCE removed	µg/m3 TCE	Lbs. TCE removed	µg/m3 VC	Lbs. VC removed	µg/m3 cis-1,2-DCE	Lbs. cis-1,2-DCE removed	Lbs. Total Pollutants Removed	Cumulative PCE lbs Removed	Cumulative Total Pollutant lbs Removed
3/27/2008	0.5	130	3,900	883	0.00	27	0.00	38	0.00	40	0.00	0.00	0.00	0.00
3/28/2008	24	127	182,880	496	0.01	27	0.00	38	0.00	40	0.00	0.01	0.01	0.01
4/24/2008	648	120	4,665,600	367	0.11	27	0.01	38	0.01	40	0.01	0.14	0.11	0.14
5/1/2008	168	115	1,159,200	394	0.03	27	0.00	38	0.00	40	0.00	0.04	0.14	0.18
6/2/2008	768	114	5,253,120	401	0.13	27	0.01	38	0.01	40	0.01	0.17	0.27	0.35
7/10/2008	912	115	6,292,800	442	0.17	27	0.01	38	0.02	40	0.02	0.21	0.45	0.56
9/12/2008	1,536	114	10,506,240	469	0.31	27	0.02	38	0.03	40	0.03	0.38	0.75	0.94
11/26/2008	1,800	113	12,204,000	489	0.37	27	0.02	38	0.03	40	0.03	0.45	1.13	1.39
3/24/2009	2,832	122	20,730,240	1,427	1.85	27	0.03	38	0.05	40	0.05	1.98	2.97	3.37
6/15/2009	1,992	122	14,581,440	394	0.36	27	0.02	38	0.03	40	0.04	0.45	3.33	3.83
8/21/2009	1,608	122	11,770,560	428	0.31	27	0.02	38	0.03	40	0.03	0.39	3.64	4.22
11/5/2009	1,824	122	13,351,680	883	0.74	27	0.02	38	0.03	40	0.03	0.82	4.38	5.04
2/5/2010	2,208	110	14,572,800	150	0.14	26.93	0.02	38	0.03	40	0.04	0.23	4.52	5.27
4/23/2010	1,848	110	12,196,800	82	0.06	27	0.02	38	0.03	40	0.03	0.14	4.58	5.41
7/23/2010	2,184	110	14,414,400	183	0.16	27	0.02	38	0.03	40	0.04	0.26	4.74	5.67
10/15/2010	2,016	130	15,724,800	102	0.10	27	0.03	38	0.04	40	0.04	0.20	4.84	5.88
1/21/2011	2,352	110	15,523,200	224	0.22	27	0.03	38	0.04	40	0.04	0.32	5.06	6.19
5/11/2011	2,640	130	20,592,000	394	0.51	27	0.03	38	0.05	40	0.05	0.64	5.57	6.84
7/29/2011	1,896	110	12,513,600	150	0.12	27	0.02	38	0.03	40	0.03	0.20	5.68	7.03
10/25/2011	2,112	110	13,939,200	204	0.18	27	0.02	38	0.03	40	0.03	0.27	5.86	7.30
1/20/2012	2,088	110	13,780,800	150	0.13	6	0.01	38	0.03	40	0.03	0.20	5.99	7.50
6/15/2012	3,528	130	27,518,400	95	0.16	8	0.01	845	1.45	40	0.07	1.70	6.15	9.20
9/25/2012	2,448	110	16,156,800	122	0.12	6	0.01	384	0.39	40	0.04	0.56	6.28	9.76
12/31/2012	2,328	130	18,158,400	116	0.13	6	0.01	512	0.58	40	0.05	0.76	6.41	10.52
3/20/2013	1,896	110	12,513,600	408	0.32	18	0.01	38	0.03	40	0.03	0.39	6.72	10.91
6/19/2013	2,184	93	12,186,720	326	0.25	15	0.01	512	0.39	40	0.03	0.68	6.97	11.59
TOTALS:	**45,841**		**320,493,180**		**6.97**		**0.43**		**3.40**		**0.79**	**11.59**		

B-5 (PID Readings)

Sample Date	Hours Per Cycle	Average Flow Rate (CFM)	Air Vol. Removed per Cycle (CF)	PID Reading (ppm VOCs)	µg/m3 VOCs	Lbs. VOCs Removed	Cum Total lbs Removed (Est from PID)
3/29/2008	50	110	330,000	0.1	1,483	0.03	0.03
6/2/2008	1,560	130	12,168,000	0.2	1,669	1.27	1.30
7/10/2008	912	110	6,019,200	0.7	2,602	0.98	2.27
9/12/2008	1,536	130	11,980,800	0.1	1,483	1.11	3.38
11/26/2008	1,800	130	14,040,000	0.1	1,483	1.30	4.68
8/21/2009	6,432	130	50,169,600	0.0	1,296	4.06	8.74
11/5/2009	1,824	130	14,227,200	0.2	1,669	1.48	10.22
2/5/2010	2,208	110	14,581,440	0.5	1,483	1.35	11.57
5/6/2010	2,160	110	14,256,000	1.4	3,908	3.48	15.04
10/15/2010	3,888	130	30,326,400	0.4	2,042	3.86	18.91
1/21/2011	2,352	110	15,523,200	0.4	2,042	1.98	20.88
5/11/2011	2,640	130	20,592,000	0.1	1,483	1.90	22.79
7/29/2011	1,896	110	12,513,600	0.4	2,042	1.6	24.38
10/25/2011	2,112	110	13,939,200	0.5	2,229	1.9	26.32
1/20/2012	2,088	110	13,780,800	0.4	2,042	1.8	28.08
6/15/2012	3,528	130	27,518,400	0.4	2,042	3.5	31.58
9/25/2012	2,448	110	16,156,800	0.5	2,229	2.2	33.83
12/31/2012	2,328	130	18,158,400	0.1	1,483	1.7	35.51
3/20/2013	1,896	110	12,513,600	0.1	1,483	1.2	36.67
6/19/2013	2,184	110	14,414,400	0.0	1,296	1.2	37.83
TOTALS:	**45,792**		**332,879,040**			**37.80**	

Lab Data for Air Mitigation System B-6
Second Quarter 2013
6/19/2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

B-6 (Lab Data)

Sample Date	Hours per Cycle	Average Flow Rate (CFM)	Air Vol. Removed per Cycle (CF)	µg/m3 PCE	Lbs. PCE removed	µg/m3 TCE	Lbs. TCE removed	µg/m3 VC	Lbs. VC removed	µg/m3 cis-1,2-DCE	Lbs. cis-1,2-DCE removed	Lbs. Total Pollutants Removed	Cumulative PCE lbs Removed	Cumulative Total Pollutant lbs Removed
3/27/2008	0.5	130	3,900	8,155	0.00	27	0.00	38	0.00	40	0.00	0.00	0.00	0.00
3/28/2008	24	119	171,144	3,330	0.04	27	0.00	38	0.00	40	0.00	0.04	0.04	0.04
4/24/2008	648	114	4,426,488	748	0.21	27	0.01	38	0.01	40	0.01	0.24	0.24	0.27
5/1/2008	168	123	1,234,800	1,427	0.11	27	0.00	38	0.00	40	0.00	0.12	0.35	0.39
6/2/2008	768	120	5,506,560	1,495	0.51	27	0.01	38	0.01	40	0.01	0.55	0.87	0.94
8/20/2008	1,896	120	13,651,200	1,835	1.56	27	0.02	38	0.03	40	0.03	1.65	2.43	2.59
9/12/2008	552	114	3,775,680	1,223	0.29	27	0.01	38	0.01	40	0.01	0.31	2.72	2.91
11/26/2008	1,800	112	12,096,000	748	0.56	27	0.02	38	0.03	40	0.03	0.64	3.28	3.55
3/24/2009	2,832	118	20,050,560	883	1.10	27	0.03	38	0.05	40	0.05	1.24	4.39	4.79
6/15/2009	1,992	118	14,103,360	571	0.50	27	0.02	38	0.03	40	0.03	0.59	4.89	5.38
8/21/2009	1,608	118	11,384,640	483	0.34	27	0.02	38	0.03	40	0.03	0.42	5.23	5.80
11/5/2009	1,824	118	12,913,920	748	0.60	27	0.02	38	0.03	40	0.03	0.69	5.83	6.49
2/5/2010	2,208	150	19,872,000	544	0.67	27	0.03	38	0.05	40	0.05	0.80	6.51	7.29
5/12/2010	2,304	93	12,856,320	883	0.71	26.93	0.02	38	0.03	40	0.03	0.79	7.22	8.08
7/23/2010	1,728	110	11,404,800	680	0.48	27	0.02	38	0.03	40	0.03	0.56	7.70	8.64
10/15/2010	2,016	130	15,724,800	129	0.13	27	0.03	38	0.04	40	0.04	0.23	7.83	8.87
1/21/2011	2,352	130	18,345,600	333	0.38	27	0.03	38	0.04	40	0.05	0.50	8.21	9.37
5/11/2011	2,640	130	20,592,000	415	0.53	27	0.03	38	0.05	40	0.05	0.67	8.74	10.04
7/29/2011	1,896	110	12,513,600	143	0.11	27	0.02	38	0.03	40	0.03	0.19	8.85	10.23
10/25/2011	2,112	110	13,939,200	170	0.15	27	0.02	38	0.03	40	0.03	0.24	8.89	10.47
1/20/2012	2,088	130	16,286,400	122	0.12	27	0.03	38	0.04	40	0.04	0.23	8.98	10.70
6/15/2012	3,528	130	27,518,400	75	0.13	27	0.05	359	0.62	40	0.07	0.86	9.02	11.56
9/25/2012	2,448	110	16,156,800	211	0.21	27	0.03	282	0.28	40	0.04	0.56	9.19	12.12
12/31/2012	2,328	130	18,158,400	163	0.18	27	0.03	359	0.41	40	0.05	0.67	9.20	12.79
3/20/2013	1,896	110	12,513,600	258	0.20	27	0.02	38	0.03	40	0.03	0.28	9.39	13.07
6/19/2013	2,184	93	12,186,720	584	0.44	27	0.02	410	0.31	40	0.03	0.81	9.65	13.88
TOTALS:	**45,841**		**327,386,892**		**10.30**		**0.55**		**2.22**		**0.81**	**13.88**		

B-6 (PID Readings)

Sample Date	Hours Per Cycle	Average Flow Rate (CFM)	Air Vol. Removed per Cycle (CF)	PID Reading (ppm VOCs)	µg/m3 VOCs	Lbs. VOCs Removed	Cum Total lbs Removed (Est from PID)
3/29/2008	50	74	222,000	1.7	4,468	0.06	0.06
6/2/2008	1,560	130	12,168,000	1.1	3,349	2.54	2.60
8/20/2008	1,896	110	12,513,600	0.5	2,229	1.74	4.34
9/12/2008	552	130	4,305,600	0.1	1,483	0.40	4.74
11/26/2008	1,800	110	11,880,000	0.2	1,669	1.24	5.98
8/21/2009	6,432	110	42,451,200	0.1	1,483	3.93	9.90
11/5/2009	1,824	130	14,227,200	0.1	1,483	1.32	11.22
2/5/2010	2,208	150	19,872,000	0.9	2,975	3.69	14.91
5/12/2010	2,304	93	12,856,320	1.7	4,468	3.58	18.49
10/15/2010	3,744	130	29,203,200	0.5	2,229	4.06	22.55
1/21/2011	2,352	130	18,345,600	0.4	2,042	2.34	24.89
5/11/2011	2,640	130	20,592,000	0.2	1,669	2.14	27.03
7/29/2011	1,896	110	12,513,600	0.3	1,856	1.45	28.48
10/25/2011	2,112	110	13,939,200	0.5	2,229	1.94	30.42
1/20/2012	2,088	130	16,286,400	0.4	2,042	2.07	32.50
6/15/2012	3,528	130	27,518,400	0.3	1,856	3.19	35.68
9/25/2012	2,448	110	16,156,800	0.5	2,229	2.25	37.93
12/31/2012	2,328	130	18,158,400	0.0	1,296	1.47	39.40
3/20/2013	1,896	110	12,513,600	0.0	1,296	1.01	40.41
6/19/2013	2,184	110	14,414,400	0.0	1,296	1.17	41.57
TOTALS:	**45,792**		**329,915,520**			**41.51**	

Lab Data for Air Mitigation System B-7
Second Quarter 2013
6/19/2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

B-7 (Lab Data)

Sample Date	Hours per Cycle	Average Flow Rate (CFM)	Air Vol. Removed per Cycle (CF)	µg/m3 PCE	Lbs. PCE removed	µg/m3 TCE	Lbs. TCE removed	µg/m3 VC	Lbs. VC removed	µg/m3 cis-1,2-DCE	Lbs. cis-1,2-DCE removed	Lbs. Total Pollutants Removed	Cumulative PCE lbs Removed	Cumulative Total Pollutant lbs Removed
4/7/2008	0.5	118	3,540	516	0.00	27	0.00	38	0.00	40	0.00	0.00	0.00	0.00
4/8/2008	24	118	169,920	319	0.00	27	0.00	38	0.00	40	0.00	0.00	0.00	0.00
4/24/2008	384	118	2,718,720	150	0.03	27	0.00	38	0.01	40	0.01	0.04	0.03	0.05
5/1/2008	168	120	1,209,600	265	0.02	27	0.00	38	0.00	40	0.00	0.03	0.05	0.08
6/2/2008	768	117	5,391,360	360	0.12	27	0.01	38	0.01	40	0.01	0.16	0.17	0.23
7/10/2008	912	118	6,456,960	367	0.15	27	0.01	38	0.02	40	0.02	0.19	0.32	0.42
9/12/2008	1,536	114	10,506,240	367	0.24	27	0.02	38	0.03	40	0.03	0.31	0.56	0.73
11/26/2008	1,800	112	12,096,000	381	0.29	27	0.02	38	0.03	40	0.03	0.37	0.85	1.10
3/24/2009	2,832	118	20,050,560	401	0.50	27	0.03	38	0.05	40	0.05	0.63	1.35	1.73
6/15/2009	1,992	118	14,103,360	34	0.03	27	0.02	38	0.03	40	0.03	0.12	1.38	1.85
8/21/2009	1,608	118	11,384,640	34	0.02	27	0.02	38	0.03	40	0.03	0.10	1.40	1.95
11/5/2009	1,824	118	12,913,920	34	0.03	27	0.02	38	0.03	40	0.03	0.11	1.43	2.06
2/5/2010	2,208	110	14,572,800	34	0.03	27	0.02	38	0.03	40	0.04	0.13	1.46	2.19
4/23/2010	1,848	130	14,414,400	34	0.03	27	0.02	38	0.03	40	0.04	0.13	1.49	2.32
7/23/2010	2,184	130	17,035,200	34	0.04	27	0.03	38	0.04	40	0.04	0.15	1.53	2.46
10/15/2010	2,016	130	15,724,800	34	0.03	27	0.03	38	0.04	40	0.04	0.14	1.56	2.60
1/21/2011	2,352	130	18,345,600	34	0.04	27	0.03	38	0.04	40	0.05	0.16	1.60	2.76
5/11/2011	2,640	130	20,592,000	34	0.04	27	0.03	38	0.05	40	0.05	0.18	1.64	2.94
7/29/2011	1,896	130	14,788,800	34	0.03	27	0.02	38	0.04	40	0.04	0.13	1.67	3.07
10/25/2011	2,112	130	16,473,600	34	0.03	27	0.03	38	0.04	40	0.04	0.14	1.71	3.21
1/20/2012	2,088	130	16,286,400	20	0.02	27	0.03	38	0.04	40	0.04	0.13	1.73	3.34
6/15/2012	3,528	130	27,518,400	17	0.03	27	0.05	307	0.53	135	0.23	0.83	1.76	4.17
9/25/2012	2,448	130	19,094,400	34	0.04	27	0.03	38	0.05	40	0.05	0.17	1.80	4.34
12/31/2012	2,328	130	18,158,400	34	0.04	27	0.03	384	0.44	40	0.05	0.55	1.84	4.88
3/20/2013	1,896	130	14,788,800	34	0.03	27	0.02	38	0.04	40	0.04	0.13	1.87	5.01
6/19/2013	2,184	110	14,414,400	41	0.04	27	0.02	333	0.30	40	0.04	0.40	1.90	5.41
TOTALS:	**43,393**		**324,798,420**		**1.87**		**0.55**		**1.63**		**0.97**	**5.01**		

B-7 (PID Readings)

Sample Date	Hours Per Cycle	Average Flow Rate (CFM)	Air Vol. Removed per Cycle (CF)	PID Reading (ppm VOCs)	µg/m3 VOCs	Lbs. VOCs Removed	Cum Total lbs Removed (Est from PID)
6/2/2008	1,344	130	10,483,200	0.3	1,856	1.21	1.21
7/10/2008	912	110	6,019,200	0.5	2,229	0.84	2.05
9/12/2008	1,536	130	11,980,800	0.1	1,483	1.11	3.16
11/26/2008	1,800	110	11,880,000	0.2	1,669	1.24	4.40
8/21/2009	6,432	132	50,941,440	0.1	1,483	4.71	9.11
11/5/2009	1,824	130	14,227,200	0.0	1,296	1.15	10.26
2/5/2010	2,208	110	14,572,800	0.1	1,483	1.35	11.60
5/6/2010	2,160	130	16,848,000	0.0	1,296	1.36	12.97
10/15/2010	3,888	130	30,326,400	0.1	1,483	2.80	15.77
1/21/2011	2,352	130	18,345,600	0.1	1,483	1.70	17.47
5/11/2011	2,640	130	20,592,000	0.0	1,296	1.66	19.13
7/29/2011	1,896	130	14,788,800	0.3	1,856	1.71	20.84
10/25/2011	2,112	130	16,473,600	0.1	1,483	1.52	22.37
1/20/2012	2,088	130	16,286,400	0.1	1,483	1.51	23.87
6/15/2012	3,528	130	27,518,400	0.0	1,296	2.22	26.10
9/2/2012	1,896	130	14,788,800	0.1	1,483	1.37	27.47
12/31/2012	2,880	130	22,464,000	0.0	1,296	1.82	29.28
3/20/2013	1,896	130	14,788,800	0.0	1,296	1.20	30.48
6/19/2013	2,184	130	17,035,200	0.0	1,296	1.38	31.86
TOTALS:	**44,232**		**339,877,440**			**30.64**	

Michigan Plaza
Second Quarter 2013
5/22/2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

Cumulative Totals (B-1-B-4)

Sample Date	Lbs PCE Removed	Cumulative PCE lbs Removed	Lbs. Total Pollutants Removed	Cumulative Total Pollutant lbs Removed
9/21/2006	0.00	0.00	0.00	0.00
10/6/2006	2.36	2.36	2.43	2.43
10/13/2006	0.68	3.05	0.71	3.14
10/20/2006	0.98	4.03	1.01	4.14
11/17/2006	3.41	7.44	3.51	7.65
12/27/2006	4.52	11.95	4.67	12.32
3/30/2007	7.00	18.95	7.33	19.65
6/15/2007	4.64	23.59	6.55	26.20
10/16/2007	6.42	30.01	6.86	33.06
12/14/2007	5.31	35.33	5.53	38.59
3/27/2008	7.84	43.17	8.23	46.82
4/1/2008	1.20	44.36	1.25	48.07
6/2/2008	4.62	48.98	4.80	52.87
9/12/2008	8.69	57.67	9.05	61.92
11/26/2008	4.38	62.05	4.62	66.54
3/24/2009	7.64	69.69	8.02	74.55
6/15/2009	4.53	74.23	4.80	79.35
8/21/2009	3.90	78.13	4.14	83.49
11/5/2009	3.90	82.03	4.17	87.66
2/5/2010	1.90	83.93	2.24	89.90
4/23/2010	0.43	84.36	0.55	90.45
7/23/2010	1.58	85.94	1.85	92.30
10/15/2010	0.57	86.50	0.78	93.07
1/21/2011	0.59	87.09	0.82	93.89
4/8/2011	1.30	88.40	1.54	95.43
5/11/2011	2.51	90.91	2.80	98.24
7/29/2011	1.26	92.17	1.53	99.77
10/25/2011	0.97	93.15	1.27	101.04
1/20/2012	0.70	93.85	1.19	102.23
6/15/2012	1.36	95.21	1.81	104.04
9/25/2012	1.60	96.81	2.57	106.61
12/31/2012	2.77	99.58	6.18	112.80
3/20/2013	3.24	102.81	4.62	117.42
5/22/2013	2.21	105.02	2.49	119.91

Maple Creek Village Apartments
Second Quarter 2013
6/19/2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

Cumulative Totals (B-5-B-7)

Sample Date	Lbs PCE Removed	Cumulative PCE lbs Removed	Lbs. Total Pollutants Removed	Cumulative Total Pollutant lbs Removed
3/27/2008	0.00	0.00	0.00	0.00
3/28/2008	0.04	0.04	0.04	0.05
4/7/2008	0.00	0.04	0.00	0.05
4/8/2008	0.00	0.05	0.00	0.05
4/24/2008	0.34	0.39	0.42	0.47
5/1/2008	0.16	0.54	0.18	0.65
6/2/2008	0.77	1.31	0.87	1.52
7/10/2008	0.32	1.63	0.40	1.93
8/20/2008	1.56	3.19	1.65	3.58
9/12/2008	0.84	4.03	1.00	4.58
11/26/2008	1.22	5.25	1.46	6.04
3/24/2009	3.45	8.71	3.85	9.89
6/15/2009	0.89	9.60	1.17	11.06
8/21/2009	0.68	10.28	0.91	11.97
11/5/2009	1.37	11.64	1.62	13.59
2/5/2010	0.84	12.48	1.16	14.75
4/23/2010	0.09	12.58	0.27	15.02
7/23/2010	0.68	13.26	0.97	15.98
10/15/2010	0.26	13.52	0.57	16.55
1/21/2011	0.64	14.16	0.98	17.53
5/11/2011	1.08	15.24	1.49	19.02
7/29/2011	0.26	15.50	0.52	19.54
10/25/2011	0.36	15.86	0.65	20.19
1/20/2012	0.27	16.13	0.56	20.75
6/15/2012	0.32	16.45	3.39	24.14
9/25/2012	0.38	16.83	1.29	25.42
12/31/2012	0.35	17.18	1.98	27.40
3/20/2013	0.55	17.73	0.81	28.21
6/19/2013	0.73	18.46	1.88	30.09

Cumulative Total LBS Removed
Second Quarter 2013
6/19/2013
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No.: M01046

Cumulative Totals (B-1-B-7)				
Sample Date	Lbs PCE Removed	Cumulative PCE lbs Removed	Lbs. Total Pollutants Removed	Cumulative Total Pollutant lbs Removed
9/21/2006	0.00	0.00	0.00	0.00
10/6/2006	2.36	2.36	2.43	2.43
10/13/2006	0.68	3.05	0.71	3.14
10/20/2006	0.98	4.03	1.01	4.14
11/17/2006	3.41	7.44	3.51	7.65
12/27/2006	4.52	11.95	4.67	12.32
3/30/2007	7.00	18.95	7.33	19.65
6/15/2007	4.64	23.59	6.55	26.20
10/16/2007	6.42	30.01	6.86	33.06
12/14/2007	5.31	35.33	5.53	38.59
3/27/2008	7.84	43.17	8.23	46.82
3/28/2008	0.04	43.21	0.04	46.87
4/1/2008	1.20	44.41	1.25	48.12
4/7/2008	0.00	44.41	0.00	48.12
4/8/2008	0.00	44.41	0.00	48.12
4/24/2008	0.34	44.75	0.42	48.54
5/1/2008	0.16	44.91	0.18	48.72
6/2/2008	5.38	50.29	5.67	54.39
7/10/2008	0.32	50.61	0.40	54.80
8/20/2008	1.56	52.18	1.65	56.45
9/12/2008	9.53	61.70	10.05	66.49
11/26/2008	5.60	67.30	6.08	72.57
3/24/2009	11.10	78.40	11.87	84.44
6/15/2009	5.42	83.82	5.97	90.41
8/21/2009	4.59	88.41	5.05	95.46
11/5/2009	5.26	93.67	5.79	101.25
2/5/2010	2.74	96.41	3.40	104.65
4/23/2010	0.52	96.93	0.82	105.47
7/23/2010	2.26	99.20	2.82	108.28
10/15/2010	0.83	100.02	1.34	109.63
1/21/2011	1.23	101.25	1.80	111.42
4/8/2011	1.30	102.55	1.54	112.96
5/11/2011	3.59	106.15	4.29	117.26
7/29/2011	1.52	107.67	2.05	119.31
10/25/2011	1.33	109.01	1.92	121.23
1/20/2012	0.97	109.98	1.75	122.98
6/15/2012	1.69	111.67	5.20	128.18
9/25/2012	1.98	113.64	3.86	132.04
12/31/2012	3.12	116.76	8.16	140.20
3/20/2013	3.79	120.55	5.42	145.62
6/19/2013	2.94	123.48	4.37	150.00

APPENDIX N

HEALTH & SAFETY PLAN

110 South Downey Avenue, Indianapolis, Indiana 46219-6406
Telephone 317-630-9060, Facsimile 317-630-9065
www.MundellAssociates.com

HEALTH AND SAFETY PLAN

INJECTION OF CAP18-ME® INTO CHLORINATED SOLVENT- IMPACTED GROUNDWATER

CLIENT: AIMCO	SITE NAME: Michigan Meadows / MI Plaza
PROJECT NAME: MI Meadows Apts	PROJECT NUMBER: M01046

PLAN APPROVAL

Matthew Bono **Plan Completed By**	Signature:__________________	Date:______________
Rondel Lattea **Site HSO**	Signature:__________________	Date:______________
Rondel Lattea **Corporate H&S Officer**	Signature:__________________	Date:______________

This Health and Safety Plan (HASP) has been written for the use of MUNDELL and its employees. It may also be used as a guidance document by properly trained and experienced MUNDELL subcontractors. However, MUNDELL does not guarantee the health or safety of any person entering this site. Questions regarding the applicability of the MUNDELL HASP should be directed to Rondel Lattea (317-630-9060).

Due to the potential hazardous nature of this site and the activity occurring thereon, it is not possible to discover, evaluate, and provide protection for all possible hazards, which may be encountered. Strict adherence to the health and safety guidelines set forth herein will reduce, but not eliminate, the potential for injury at this site. The health and safety guidelines in this Plan were prepared specifically for this site and should not be used on any other site without prior research by trained health and safety specialists.

MUNDELL claims no responsibility for its use by others. The Plan is written for the specific site conditions, purposes, and personnel specified and must be amended if these conditions change.

MUNDELL & ASSOCIATES, INC.

HEALTH AND SAFETY PLAN ACKNOWLEDGEMENT AND AGREEMENT FORM

(All MUNDELL **and subcontractor personnel must sign.)**

A new "Acknowledgement And Agreement Form" must be completed for each mobilization. Maintain previous forms with the master copy of the HASP.

Mobilization Start Date: / /
Mobilization End Date: / /

I acknowledge I have reviewed a copy of the Health and Safety Plan for this project, understand it, and agree to comply with all of its provisions. I also understand I could be prohibited by the Site Health and Safety Officer or other MUNDELL personnel from working on this project for not complying with any aspect of this Health and Safety Plan:

Name	Signature	Company	Date
Name	Signature	Company	Date
Name	Signature	Company	Date
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Name	Signature	Company	Date
Name	Signature	Company	Date
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Name	Signature	Company	Date

I. GENERAL INFORMATION

Scope of Work

This HASP applies to the following activities:

- Injection of CAP18-ME® compound (Anaerobic Bioremediation Product) slurry into the groundwater between 13 and 36 ft-bgs at a total of sixty-seven (67) locations on the Plaza and Apartment properties in three main injection areas.

LOCAL EMERGENCY NUMBERS*:

	NAME	TELEPHONE NUMBER
Hospital	Methodist Hospital	(317) 962-2000
Ambulance	Emergency Medical Ambulance	317-243-7917
Police/Sheriff	Indianapolis Police Department	317-327-3811
Fire	Indianapolis Fire Department	317-327-6041
Other:		

*Include numbers other than “911”.

PROJECT PERSONNEL NUMBERS:

	NAME	TELEPHONE NUMBER
Site Health and Safety Officer	Rondel Lattea (MUNDELL)	317-442-6070 (m) 317-630-9060 (o)
Project Manager	Mark Breting (MUNDELL)	317-313-8306 (m) 317-630-9060 (o)
Client Contact	Stephen Evanoff	303-691-4560
Drilling Subcontractor Contact	Marty Hicks (Midway)	317-319-2827
Corporate Health and Safety	Rondel Lattea	317-442-6070 (m) 317-630-9060 (o)

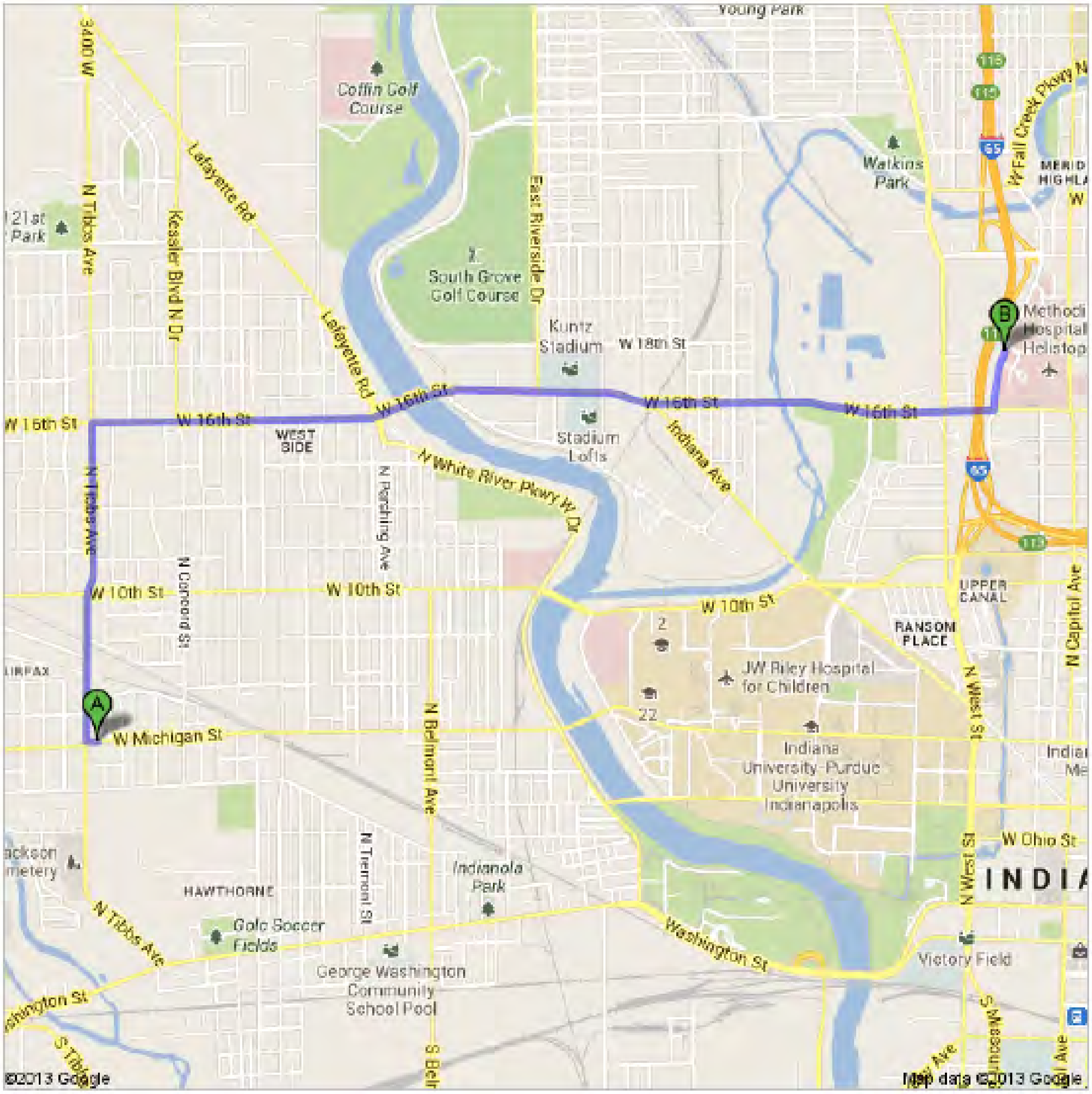
GOVERNMENTAL CONTACT NUMBERS:

	NAME	TELEPHONE NUMBER
State Fire Marshall	Roger Johnson	317-232-2226

HOSPITAL LOCATION MAP (attach or draw):

Google

Directions to Methodist Hospital-Emergency Room
1701 Senate Blvd, Indianapolis, IN 46202
3.8 mi – about **10 mins**



3801 W Michigan St, Indianapolis, IN 46222

1.	Head **west** on **W Michigan St**	go 36 ft total 36 ft
2.	Slight right to stay on **W Michigan St**	go 151 ft total 187 ft
3.	Turn right onto **N Tibbs Ave** About 3 mins	go 0.9 mi total 1.0 mi
4.	Turn right onto **W 16th St** About 7 mins	go 2.7 mi total 3.7 mi
5.	Turn left onto **Senate Blvd** About 48 secs	go 0.2 mi total 3.9 mi

Methodist Hospital-Emergency Room
1701 Senate Blvd, Indianapolis, IN 46202

II. TASK SPECIFIC HEALTH AND SAFETY RISK ANALYSIS

A. Predominant Potential Site Chemical Hazards

CHEMICAL (OR CLASS)	PEL/TLV	OTHER PERTINENT LIMITS	WARNING PROPERTIES	ROUTES OF EXPOSURE OR IRRITATION	ACUTE HEALTH EFFECTS	CHRONIC HEALTH EFFECTS/ TARGET ORGANS
Tricloroethylene (TCE)	50 ppm per 8hr workshift	PEL STEL = 100 ppm IDLH = 1000 ppm	Sweet odor	Inhalation, dermal, ingestion	Skin/eye/respiratory, eye irritant, headache, dizziness, weakness	CNS, liver, kidneys, skin
Cis-1,2-DCE	200 ppm per 8 hr worshift	IDLH = 1,000 ppm	Colorless liquid	Inhalation, dermal, ingestion	Skin/eye/respiratory, headache, dizziness, weakness	CNS/Carcinogen
Vinyl Chloride	1 ppm per 8 hr workshift	PEL STEL = 18 ppm IDLH = 500 ppm	Faint, sweet odor	Inhalation, dermal, ingestion	Skin/eye/respiratory,eye irritant, headache, dizziness, weakness	CNS
Trans-1,2-DCE	200 ppm per 8 hr worshift	IDLH= 1,000ppm	Colorless liquid	Inhalation, dermal, ingestion	Skin/eye/respiratory, headache, dizziness, weakness	CNS, skin

PEL/TLV = Permissible Exposure Limit/ Threshold Limit Value (ACGIH)
STEL = Short Term Exposure Limit (15 minutes).
IDLH = Immediately Dangerous to Life or Health.
CEIL = Ceiling value exposure limit.

B. Chemical Monitoring

Due to the nature of the work being performed (subsurface injections) chemical monitoring will not be performed as a part of the health and safety program. If chemicals of concern are present in sufficient quantities to be noticeable this HASP must be revised and the Site hazards re-evaluated.

C. Personal Protective Equipment Requirements:

All work will be performed in Level D personal protective equipment. Level D equipment, at a minimum, shall include the following: Hardhat, steel toe boots, safety glasses, disposable nitrile gloves, and high-visibility vest for exterior high traffic areas.

III. GENERAL SITE REQUIREMENTS AND BACKGROUND INFORMATION

A. Health and Safety Plan Responsibilities

The Site Health and Safety Officer will oversee the overall Plan. He/she has the authority to stop work or prohibit any personnel from working on the site at any time for not complying with any aspect of the Plan. He/she will perform lock out/tag out procedures.

The Subcontractor Field Supervisor is responsible for implementing the Plan for his/her own employees.

Each person on the site has responsibility for their own health and safety, as well as assisting others in carrying out the Plan. Any person observed to be in violation of the Plan should be assisted in complying with the Plan, or reported to the Site Health and Safety Officer or the Subcontractor Field Supervisor.

Any site personnel may shut down field activities if there is a real or perceived immediate danger to life or health.

B. Training and Medical Surveillance Requirements for Site Personnel

- 40 hr. Hazardous Waste Operations Training (HAZWOPER)
- 8 hr. Annual HAZWOPER Refresher Training

C. Purpose of Field Work:

- Injection of EHC compound (Zero Valent Iron Carbon Substrate) slurry into the groundwater between 8 and 38 ft-bgs at seven (7) locations in the pilot test area on Pine St between Oak St and Laurel St and approximately thirty (30) locations at the source area on the property located at 500 Poplar St.

Will any work be done inside a confined space? If YES, describe: YES☐ NO☒

Excavation and/or trenching will be done on this site? If YES, describe: YES☐ NO☒

Site is in an area containing a current/former landfill? If YES, describe: YES☐ NO☒

Work will be done during daylight hours? If NO, describe: YES☒ NO☐

Will any hazardous materials (chemicals) be used on-site? If YES, describe: YES☐ NO☒

Site occupied? If Yes, describe current activities and relationship to field work): YES☒ NO☐
While the injection activities are being completed. be aware of vehicle traffic, pedestrians and children in immediate vicinity. Use cones and/or caution tape to dissuade passers by from entering any of the drilling areas in which work is being done.

IV. WASTE CHARACTERISTICS

Waste Anticipated: YES☐ NO☒

Types: LIQUID☐ SOLID☐ SLUDGE☐ OTHER(describe)☐

Quantity (Expected Volume): Approximately 23 drums of soil cuttings and up to 8 drums of development and decon water. Soil and water will be containerized in 55 gallon DOT drums for subsequent disposal.

Health Effects: CORROSIVE☐ FLAMMABLE☐ RADIOACTIVE☐
TOXIC☐
OTHER (describe)☐

Packaging requirements for waste material (Expected):

OPEN HEAD 55-GAL DRUM ☐
CLOSED HEAD 55-GAL DRUM ☐
OVERPACK DRUM ☐
ROLL-OFF BIN ☐
BAKER TANK ☐
LINED WASTE BINS ☐
OTHER (describe)☐

Disposal and/or Treatment Methods Proposed: No waste anticipated.

Potential Non-chemical Hazards

	YES	NO
Overhead/underground hazards	☒	☐

Overhead

Electrical connections from power lines and telecommunications cables are visible, and should be carefully avoided during the drilling activities.

Underground

Underground utilities include sewer, electrical, telecommunications, gas, and water lines. Utility lines will be identified.

	YES	NO
Structural hazards	☐	☒

None.

	YES	NO
Equipment hazards Geoprobe Drilling	☒	☐

	YES	NO
Heat exposure	☒	☐
Cold exposure	☐	☒

	YES	NO
Oxygen deficiency	☐	☒
Confined space	☐	☒
Noise	☒	☐
Ionizing radiation	☐	☒
Non-ionizing radiation	☐	☒
Fire/Explosion	☐	☒
Electrical	☒	☐

Biological (work near sewer)	☐	☒
Work Surfaces	☐	☒
Shoring	☐	☒
Traffic	☒	☐

Other: Be aware of street traffic and pedestrian traffic.

Task Specific Hazards:

	UNKNOWN	LOW	MODERATE	SERIOUS	EXTREME	NA
Utility clearance	☐	☐	☒	☐	☐	☐
Barricading and sign posting	☐	☐	☒	☐	☐	☐
Collecting soil samples	☐	☐	☐	☐	☐	☒
Observe Excavating as necessary	☐	☐	☐	☐	☐	☒
Supervise drilling activities	☐	☐	☒	☐	☐	☐
Supervise well installation	☐	☐	☐	☐	☐	☒
Overall Hazard Rating	☐	☐	☒	☐	☐	

V. GENERAL SITE HEALTH AND SAFETY PROCEDURES

A. Work Limitations and Restrictions:

No eating, drinking, or smoking on-site, except in the support zone.

Potable water must always be available at the work site.

Heat and Cold Stress

The Site Health and Safety Officer will monitor weather broadcasts before the start of outdoor work each day, and more frequently as necessary. No work will be done outdoors during hazardous weather conditions.

☒**Heat Stress**

For temperatures above 75^{O}F, breaks should be taken every hour. At least 8 ounces (1 cup) of cool water, Gatorade-type drink, or diluted fruit juice should be consumed at each rest break

If the air temperature is greater than 95^{O}F, work should be done for 30 minutes with a rest break of 10 minutes for Level D. For Level C, work should be done for 20 minutes, with a rest break of 10 minutes. At least 8 ounces (1 cup) of cool water, Gatorade-type drink, or diluted fruit juice should be consumed at each rest break or at least one cup every 20 minutes.

Work should stop if any of the following symptoms occur: muscle spasm and/or pain in the limbs or abdomen (heat cramps); weak pulse, heavy sweating, dizziness, and/or fatigue (heat exhaustion); or rapid pulse, no sweating, nausea, dizziness, and/or confusion (heat stroke). Provide First Aid immediately.

Use sunscreen on unprotected skin to protect against ultraviolet exposure as necessary.

☐Cold Stress

For temperatures below 40^{O}F, adequate insulating clothing must be worn. If the temperature is below 20^{O}F, workers will be allowed to enter a heated shelter at regular intervals. Warm sweet drinks should be available. Coffee intake should be limited.

No one should begin work or return to work from a heated shelter with wet clothes. Workers should be aware of signs of cold stress such as heavy shivering, pain in the fingers or toes, drowsiness, or irritability. Onset of any of these signs is indication for immediate return to a heated shelter.

E. Decontamination Procedures:

Personnel: Nitrile gloves

Injection Apparatus: Distilled water and non-phosphate detergent for injection rods.

VI. CONTINGENCY PLAN

A. Injury or Illness:

If an injury or illness occurs, take the following action:

- Get First Aid for the person immediately.
- Notify the Site Health and Safety Officer. The Site Health and Safety Officer is responsible for immediately notifying the Project Manager, and preparing and submitting an Injury/Illness Incident Report (Attachment 9) to the Health and Safety Director (HSD) within 24 hours, as well as notifying the employee's supervisor and Principal-in-Charge. If a subcontractor employee is injured, the Subcontractor Field Supervisor will also complete their own injury/illness investigation and submit a copy of their report to the MUNDELL HSD as well.

The Site Health and Safety Officer will assume charge during a medical emergency.

B. Site Incident:

If an incident occurs, take the following action:

Notify the SHSO immediately. The SHSO is responsible for immediately notifying the Project Manager, and preparing and submitting a Site Incident Report (Attachment 10) to the HSD within 24 hours.

MUNDELL **INJURY/ILLNESS REPORT**

(Use additional space as necessary)

DATE OF INCIDENT________________ CASE NO.________ TIME OF DAY______________________________________

EMPLOYEE NAME____ DATE OF BIRTH____________________________

HOME ADDRESS____ PHONE NO._________________________________

SEX: MALE_ FEMALE__ AGE__ JOB TITLE______________ SOCIAL SECURITY NO.__________________________

OFFICE LOCATION____ DATE OF HIRE_____________________________

WHERE DID INCIDENT OCCUR? (INCLUDE ADDRESS)____

ON EMPLOYER'S PREMISES? YES___ NO___ PROJECT NAME/NO.____

WHAT WAS EMPLOYEE DOING WHEN INCIDENT OCCURRED? (BE SPECIFIC)____

HOW DID THE INCIDENT OCCUR? (DESCRIBE FULLY)____

WHAT STEPS COULD BE TAKEN TO PREVENT SUCH AN INCIDENT?____

OBJECT OR SUBSTANCE THAT DIRECTLY CAUSED INCIDENT?____

DESCRIBE THE INJURY OR ILLNESS___________________________ PART OF BODY AFFECTED_______________________

NAME AND ADDRESS OF PHYSICIAN____

IF HOSPITALIZED, NAME AND ADDRESS OF HOSPITAL____

LOSS OF ONE OR MORE DAYS OF WORK? YES/NO__ IF YES-DATE LAST WORKED_________________________________

HAS EMPLOYEE RETURNED TO WORK? YES/NO____ IF YES-DATE RETURNED____________________________________

DID EMPLOYEE DIE? YES/NO________ IF YES, DATE____

COMPLETED BY (PRINT) ______________________________
(Supervisor or Site Health & Safety Officer)

SIGNATURE ______________________________

DATE ______________________________

EMPLOYEE SIGNATURE ______________________________

DATE ______________________________

PIC SIGNATURE ______________________________

DATE ______________________________

This report must be completed by the employee's supervisor or Site Health and Safety Officer immediately upon learning of the incident. The completed report must be reviewed and signed by the Principal-in-charge and transmitted to Corporate Health and Safety, and Health & Safety Coordinator within 24 hours of the incident, even if employee is not available to review and sign. Employee or employee's doctor must submit a copy of the doctor's report to Corporate Health and Safety within 24 hours of the initial exam and any subsequent exams. For field injuries, submit a copy of the Health and Safety Plan. A detailed synopsis of events including corrective action to be taken must be submitted by the PIC to Corporate Health & Safety within 1 week of the injury/illness. REV:11-17-95

SITE INCIDENT REPORT
(Attach additional documentation as necessary)

Date of Incident:____________________ **Time of Incident:**_________________________

Location of Incident:__________________ **Project Name:** ___

Project Number:____

Type of Incident* (check those that apply):

_____ "Near Miss" _____ Vehicle Accident

_____Underground Property Damage _____ Fire

_____ Above-ground Property Damage _____ Evacuation

_____Chemical Exposure _____ Regulatory Agency Inspection or Violation

Other (describe)____

*Submit copy of Health & Safety Plan and Attachments for field-related incidents.

Description of Incident:____

____

Cause of Incident:____

____

Action Taken:____

____

Future Corrective Action:____

____

Estimated Amount of Damage:____

____

Investigator Name **Signature** **Date**

____

Principal-in-Charge **Signature** **Date**

cc: Corporate Health & Safety, Vice-president of Operations, & Corporate Contracts/Admin. within 24 hours of incident.

MATERIAL SAFETY DATA SHEETS

Anaerobic Bioremediation Product

EC- SAFETY DATA SHEET according to EC directive 2001/58/EC

MATERIAL SAFETY DATA SHEET

SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: CAP18-ME® Anaerobic Bioremediation Product
SYNONYMS AND ALTERNATE TRADE NAMES: None.
USE OF SUNSTANCE: Groundwater remediation.

COMPANY NAME (US): CARUS CORPORATION	**COMPANY ADDRESS:**	315 Fifth Street Peru, IL 61354, USA
	INFORMATION:	(815) 223-1500 (815) 224-6816 (FAX) www.caruscorporation.com (Web) salesmkt@carusorporation.com (Email)
	EMERGENCY TELEPHONE:	(800) 435 –6856 (USA) (815) 223-1500 (Other countries) (800) 424-9300 (CHEMTREC®, USA) (703) 527-3887 (CHEMTREC®,, Other countries)
COMPANY NAME (Europe): CARUS NALON S.L.	**COMPANY ADDRESS:**	Barrio Nalon, s/n 33100 Trubia-Oviedo Espana, Spain
	INFORMATION:	(34) 985-785-513
	EMERGENCY TELEPHONE:	(34) 985-785-513

SECTION 2 HAZARDS IDENTIFICATION

Hazardous Materials Identification System (HMIS) Ratings:
Health: 1 - Slight
Flammability: 1 - Slight
Reactivity: 1 - Slight
Personnel Protective Equipment: C : goggles, , apron, and proper gloves.

ACUTE HEALTH EFFECTS
All components are Generally Recognized As Safe under USDA guidelines.

EYES: This product may cause slight eye irritation.
SKIN CONTACT: This product may cause slight skin irritation.
INHALATION: High vapor or aerosol concentrations may be irritating to nose, throat, and upper respiratory tract.

INGESTION: Ingestion of large amounts may produce gastrointestinal disturbances including irritation, nausea, and diarrhea.

CHRONIC HEALTH EFFECTS
This material does not contain any chemical listed as a carcinogen or potential carcinogen by OSHA.

SECTION 3. HAZARDOUS INGREDIENTS

INGREDIENTS	CAS NUMBER	EC NUMBER	PERCENT
Mixed triacylglycerides, soybean oil	8001-22-7	232-274-4	80- 100%
Methyl ester, soybean oil	67784-80-9	267-055-2	0-20%

HAZARD SYMBOLS: None
RISK PHRASES: None
SAFETY PHRASES: None

SECTION 4 FIRST AID MEASURES

Eyes:
Immediately flush eyes with large amounts of water for at least 15 minutes holding lids apart to ensure flushing of the entire surface.
Skin:
Immediately wash contaminated areas with water. Remove contaminated clothing and footwear. Wash clothing and decontaminate footwear before reuse.
Inhalation:
Remove person from contaminated area to fresh air.
Ingestion:
Never give anything by mouth to an unconscious or convulsing person. If person is conscious, give large quantities of water or milk. Seek medical attention immediately.

SECTION 5. FIRE FIGHTING MEASURES

NFPA* HAZARD SIGNS

Health Hazard	1	=	Materials which under fire conditions would give off irritating combustion products. (less than 1 hour exposure) Materials that on the skin could cause irritation.
Flammability Hazard	1	=	Flash point at or above 200 F (93.4 C).Must be preheated for ignition to occur. Will burn in air when exposed at 1500 F (815.5 C) for 5 minutes.
Reactivity Hazard	1	=	Normally stable material, which can become unstable at high temperature and pressure.
Special Hazard			None

***National Fire Protection Association 704 (USA)**

FLAMMABILITY CLASSIFICATION: Combustible liquid – Class IIIB.
FLASH POINT: Greater than 201ºF (PMCC method).
EXTINGUISHING MEDIA: Dry chemical, water fog, carbon dioxide, foam, or Type K fire extinguishers.
FIRE / EXPLOSION HAZARDS: Rags or waste paper soaked with this material may heat and burn spontaneously. Not an explosion hazard.
FIGHTING PROCEDURES: Use of self-contained breathing apparatus is recommended. Apply water fog or mist gently. Avoid heavy application of water as it may cause oil to foam or may spread fire by dispersing oil. Avoid contact with hot oil.
HAZARDOUS DECOMPOSITION PRODUCTS: Oxides of carbon

SECTION 6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS:
Ensure adequate ventilation. Avoid inhalation and contact with eyes and skin. Personnel should wear protective clothing suitable for the task. Remove all ignition sources and incompatible materials before attempting clean up.

ENVIRONMENTAL PRECAUTIONS:
Do not flush into sanitary sewer system or surface water. If accidental release into the environment occurs, inform the responsible authorities. Keep the product away from drains, sewers, surface and ground water and soil.

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:
Surfaces will be slippery after spillage. Spilled material can be absorbed with earth, sand, vermiculite, cat litter, or other absorbent. Clean area with detergent and water. Large spills can be diked and squeegeed or pumped into a container. All disposals should be in accordance with local, state, and federal agency procedures.

SECTION 7 HANDLING AND STORAGE

WORK/HYGIENIC PRACTICES
Wash hands thoroughly with soap and water after handling the product. Wear proper protective equipment. Remove clothing, if it becomes contaminated.
VENTILATION REQUIREMETNS
Provide sufficient mechanical and/or local exhaust.
CONDITIONS FOR SAFE STORAGE
Store in accordance with NFPA 30 requirements for Class IIIB combustible liquids. Protect containers from physical damage. Store in a cool, dry area in closed containers. Keep away from heat and flames. Do not store near strong acids or oxidizing agents.

Do not keep soiled rags or other absorbent type materials under high temperature and closed conditions in the presence of oxygen.

SECTION 8 EXPOSURE CONTROLS AND PERSONAL PROTECTION

EXPOSURE LIMITS: As an oil mist - 15 mg/m^3 and 5 mg/m^3 respirable (OSHA).

ENGINEERING CONTROLS: Provide mechanical local and/or general ventilation.

PERSONAL PROTECTIVE EQUIPMENT

EYES: Use safety glasses or goggles.

RESPIRATORY: Not normally needed. If mists are present use a NIOSH-approved respirator for organic vapors.

SKIN PROTECTION: Wear rubber or neoprene gloves and footwear, and otherwise normal work clothing.

SECTION 9. CHEMICAL AND PHYSICAL PROPERTIES

APPEARANCE: Pale yellow, slightly viscous, oily liquid.
ODOR: Faint, bland to slightly sweet odor.
pH: Not applicable.
PERCENT VOLATILE: Not available.
VAPOR PRESSURE: Not available.
VAPOR DENSITY: Estimated heavier than air.

BOILING POINT: Not available.
MELTING POINT: Not applicable (liquid at standard conditions).
SOLUBILITY: Insoluble.
EVAPORATION RATE: Not applicable.
SPECIFIC GRAVITY: Approximately 0.92 (water = 1).

SECTION 10. STABILITY AND REACTIVITY

STABILITY: Stable under normal conditions. Soaked rags or paper may spontaneously combust (see Section 5).
CONDITIONS TO AVOID: Heat and exposure to strong acids or oxidizers. High surface area exposures (such as soaked rags or paper) exposed to oxygen can result in polymerization and heat production.
HAZARDOUS POLYMERIZATION: Will not occur.
HAZARDOUS DECOMPOSITION PRODUCTS: Methanol may be formed by hydrolysis or saponification.
INCOMPATIBLE MATERIALS: Strong acids and oxidizers.

SECTION 11 TOXICOLOGICAL INFORMATION

No component is a known or suspected carcinogen or mutagen. The following data are available for individual components:

EYE EFFECTS: Minimally irritating.
SKIN EFFECTS: Non-irritating.
DERMAL LD_{50}: Minimum of >2000 mg/kg (rabbit).
ORAL LD_{50}: Minimum of >5000 mg/kg (rat).

SECTION 12 ECOLOGICAL INFORMATION

ENTRY TO THE ENVIRONMENT
This product has a low estimated lifetime in the environment, being readily biodegradable.
BIOCONCENTRATION POTENTIAL
This product has a very low bioaccumulative potential.
AQUATIC TOXICITY
No data available.

SECTION 13 DISPOSAL CONSIDERATIONS

Waste Disposal:
Disposal of all materials shall be in full and strict compliance with all federal, state, and local regulations pertaining to phosphates. Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

SECTION 14 TRANSPORT INFORMATION

Not regulated by US DOT, Canada TDG, UN, IMDG, IATA regulations

SECTION 15 REGULATORY INFORMATION

US Federal Regulations
TSCA:
All components in this product are listed on the TSCA inventory.
Health & Safety Reporting List:
None of the chemicals in this product are on the Health & Safety Reporting List.
Chemical Test Rules:
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b:
None of the chemicals in this product are listed under TSCA Section 12b.
TSCA Significant New Use Rule:
None of the chemicals in this product have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs:
None of the chemicals in this product have an RQ.
SARA Section 302 Extremely Hazardous Substances:
None of the chemicals in this product have a TPQ.
SARA Codes:
Non Applicable
Section 313:
None of chemicals in this product are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants.

This material does not contain any Class 1 or Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

FIFRA:

CAS# 8001-22-7 is found on the on the list of FIFRA Active Ingredients Of Registered Pesticides

State:

CAS# 8001-22-7 is found on the on state lists from PA.

California Prop 65:

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives:

HAZARD SYMBOLS: None

RISK PHRASES: None

SAFETY PHRASES: None

WGK (Water Danger/Protection): VwVwS: legally effective classification in annex 1 or 2 of the VwVwS (Administrative Regulation on the Classification of Substances Hazardous to Waters into Water Hazard Classes)

Canada - DSL/NDSL:

Listed in DSL

Canada – WHMIS:

None of the components in this product could be classified as hazardous in accordance with the hazard criteria of the Controlled Products Regulations of Canada.

Canadian Ingredient Disclosure List:

None of the components in this product are listed on the Canadian Ingredient Disclosure List.

SECTION 16 OTHER INFORMATION

NIOSH:	National Institute for Occupational Safety and Health
MSHA:	Mine Safety and Health Administration
OSHA:	Occupational Safety and Health Administration
NTP:	National Toxicology Program
IARC:	International Agency for Research on Cancer
PEL:	Permissible Exposure Limit
DSL/NDSL:	The Domestic Substances and the Non-Domestic Substances List (Canada)

TLV-TWA:	Threshold Limit Value-Time Weighted Average
CAS:	Chemical Abstract Service
EINECS:	Inventory of Existing Chemical Substances (European) (EC. No.)

The information contained herein is accurate to the best of our knowledge. However, data, safety standards and government regulations are subject to change and, therefore, holders and users should satisfy themselves that they are aware of all current data and regulations relevant to their particular use of product. CARUS CHEMICAL COMPANY DISCLAIMS ALL LIABILITY FOR RELIANCE ON THE COMPLETENESS OR ACCURACY OR THE INFORMATION INCLUDED HEREIN. CARUS CHEMICAL COMPANY MAKES NO WARRANTY, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTIABILITY OR FITNESS FOR PARTICULAR USE OR PURPOSE OF THE PRODUCT DESCRIBED HEREIN. All conditions relating to storage, handling, and use of the product are beyond the control of Carus Corporation, and shall be the sole responsibility of the holder or user of the product.

CARUS CORPORATION, 315 FIFTH STREET, PERU, IL

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Good Chemistry at Work

Chithambarathanu Pillai

May 2008

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Health	2
Fire	0
Reactivity	0
Personal Protection	G

Material Safety Data Sheet
Tetrachloroethylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Tetrachloroethylene

Catalog Codes: SLT3220

CAS#: 127-18-4

RTECS: KX3850000

TSCA: TSCA 8(b) inventory: Tetrachloroethylene

CI#: Not available.

Synonym: Perchloroethylene; 1,1,2,2-Tetrachloroethylene; Carbon bichloride; Carbon dichloride; Ankilostin; Didakene; Dilatin PT; Ethene, tetrachloro-; Ethylene tetrachloride; Perawin; Perchlor; Perclene; Perclene D; Percosolvel; Tetrachloroethene; Tetraleno; Tetralex; Tetravec; Tetroguer; Tetropil

Chemical Name: Ethylene, tetrachloro-

Chemical Formula: C2-Cl4

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Tetrachloroethylene	127-18-4	100

Toxicological Data on Ingredients: Tetrachloroethylene: ORAL (LD50): Acute: 2629 mg/kg [Rat]. DERMAL (LD): Acute: >3228 mg/kg [Rabbit]. MIST(LC50): Acute: 34200 mg/m 8 hours [Rat]. VAPOR (LC50): Acute: 5200 ppm 4 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator), of eye contact (irritant), of ingestion.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. Classified 2A (Probable for human.) by IARC, 2 (anticipated carcinogen) by NTP.
MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast.
TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Not available.
The substance may be toxic to kidneys, liver, peripheral nervous system, respiratory tract, skin, central nervous system (CNS).
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with skin. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, metals, acids, alkalis.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

Personal Protection:
Safety glasses. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent.
Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 25 (ppm) from OSHA (PEL) [United States]
TWA: 25 STEL: 100 (ppm) from ACGIH (TLV) [United States]
TWA: 170 (mg/m3) from OSHA (PEL) [United States]
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Ethereal.

Taste: Not available.

Molecular Weight: 165.83 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 121.3°C (250.3°F)

Melting Point: -22.3°C (-8.1°F)

Critical Temperature: 347.1°C (656.8°F)

Specific Gravity: 1.6227 (Water = 1)

Vapor Pressure: 1.7 kPa (@ 20°C)

Vapor Density: 5.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 5 - 50 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.4

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Miscible with alcohol, ether, chloroform, benzene, hexane.
It dissolves in most of the fixed and volatile oils.
Solubility in water: 0.015 g/100 ml @ 25 deg. C
It slowly decomposes in water to yield Trichloroacetic and Hydrochloric acids.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, metals, acids, alkalis.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Oxidized by strong oxidizing agents.
Incompatible with sodium hydroxide, finely divided or powdered metals such as zinc, aluminum, magnesium, potassium, chemically active metals such as lithium, beryllium , barium.
Protect from light.

Special Remarks on Corrosivity: Slowly corrodes aluminum, iron, and zinc.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.
Acute oral toxicity (LD50): 2629 mg/kg [Rat].
Acute dermal toxicity (LD50): >3228 mg/kg [Rabbit].
Acute toxicity of the vapor (LC50): 5200 4 hours [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. Classified 2A (Probable for human.) by IARC, 2 (Some evidence.) by NTP.
MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast.
May cause damage to the following organs: kidneys, liver, peripheral nervous system, upper respiratory tract,

skin, central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of inhalation.
Slightly hazardous in case of skin contact (permeator), of ingestion.

Special Remarks on Toxicity to Animals:
Lowest Publishe Lethal Dose/Conc:
LDL [Rabbit] - Route: Oral; Dose: 5000 mg/kg
LDL [Dog] - Route: Oral; Dose: 4000 mg/kg
LDL [Cat] - Route: Oral; Dose: 4000 mg/kg

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects and birth defects(teratogenic).
May affect genetic material (mutagenic).
May cause cancer.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: Causes skin irritation with possible dermal blistering or burns. Symtoms may include redness, itching, pain, and possible dermal blistering or burns. It may be absorbed through the skin with possible systemic effects. A single prolonged skin exposure is not likely to result in the material being absorbed in harmful amounts.
Eyes: Contact causes transient eye irritation, lacrimation. Vapors cause eye/conjunctival irritation. Symptoms may include redness and pain.
Inhalation: The main route to occupational exposure is by inhalation since it is readily absorbed through the lungs. It causes respiratory tract irritation, . It can affect behavior/central nervous system (CNS depressant and anesthesia ranging from slight inebriation to death, vertigo, somnolence, anxiety, headache, excitement, hallucinations, muscle incoordination, dizziness, lightheadness, disorentiation, seizures, enotional instability, stupor, coma). It may cause pulmonary edema
Ingestion: It can cause nausea, vomiting, anorexia, diarrhea, bloody stool. It may affect the liver, urinary system (proteinuria, hematuria, renal failure, renal tubular disorder), heart (arrhythmias). It may affect behavior/central nervous system with symptoms similar to that of inhalation.
Chronic Potential Health Effects:
Skin: Prolonged or repeated skin contact may result in excessive drying of the skin, and irritation.
Ingestion/Inhalation: Chronic exposure can affect the liver(hepatitis,fatty liver degeneration), kidneys, spleen, and heart (irregular heartbeat/arrhythmias, cardiomyopathy, abnormal EEG), brain, behavior/central nervous system/peripheral nervous system (impaired memory, numbness of extremeties, peripheral neuropathy and other

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 18.4 mg/l 96 hours [Fish (Fatthead Minnow)]. 18 mg/l 48 hours [Daphnia (daphnia)]. 5 mg/l 96 hours [Fish (Rainbow Trout)]. 13 mg/l 96 hours [Fish (Bluegill sunfish)].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Tetrachloroethylene UNNA: 1897 PG: III

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Tetrachloroethylene
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Tetrachloroethylene
Connecticut hazardous material survey.: Tetrachloroethylene
Illinois toxic substances disclosure to employee act: Tetrachloroethylene
Illinois chemical safety act: Tetrachloroethylene
New York release reporting list: Tetrachloroethylene
Rhode Island RTK hazardous substances: Tetrachloroethylene
Pennsylvania RTK: Tetrachloroethylene
Minnesota: Tetrachloroethylene
Michigan critical material: Tetrachloroethylene
Massachusetts RTK: Tetrachloroethylene
Massachusetts spill list: Tetrachloroethylene
New Jersey: Tetrachloroethylene
New Jersey spill list: Tetrachloroethylene
Louisiana spill reporting: Tetrachloroethylene
California Director's List of Hazardous Substances: Tetrachloroethylene
TSCA 8(b) inventory: Tetrachloroethylene
TSCA 8(d) H and S data reporting: Tetrachloroethylene: Effective date: 6/1/87; Sunset date: 6/1/97
SARA 313 toxic chemical notification and release reporting: Tetrachloroethylene
CERCLA: Hazardous substances.: Tetrachloroethylene: 100 lbs. (45.36 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R40- Possible risks of irreversible effects.
R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S23- Do not breathe gas/fumes/vapour/spray
S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S37- Wear suitable gloves.
S61- Avoid release to the environment. Refer to special instructions/Safety data sheets.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: g

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:29 PM

Last Updated: 10/10/2005 08:29 PM

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MSDS Number: **T4940** * * * * * *Effective Date:* ***12/06/07*** * * * * * *Supercedes:* ***08/01/05***

MSDS Material Safety Data Sheet

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

TRICHLOROETHYLENE

1. Product Identification

Synonyms: Trichloroethene; TCE; acetylene trichloride; Ethinyl trichloride
CAS No.: 79-01-6
Molecular Weight: 131.39
Chemical Formula: C2HCl3
Product Codes:
J.T. Baker: 5376, 9454, 9458, 9464, 9473
Mallinckrodt: 8600, 8633

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Trichloroethylene	79-01-6	100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS HEART, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES SEVERE SKIN IRRITATION. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Poison)
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Vapors can irritate the respiratory tract. Causes depression of the central nervous system with symptoms of visual disturbances and mental confusion, incoordination, headache, nausea, euphoria, and dizziness. Inhalation of high concentrations could cause unconsciousness, heart effects, liver effects, kidney effects, and death.
Ingestion:
Cases irritation to gastrointestinal tract. May also cause effects similar to inhalation. May cause coughing, abdominal pain, diarrhea, dizziness, pulmonary edema, unconsciousness. Kidney failure can result in severe cases. Estimated fatal dose is 3-5 ml/kg.
Skin Contact:
Cause irritation, redness and pain. Can cause blistering. Continued skin contact has a defatting action and can produce rough, dry, red skin resulting in secondary infection.
Eye Contact:
Vapors may cause severe irritation with redness and pain. Splashes may cause eye damage.
Chronic Exposure:
Chronic exposures may cause liver, kidney, central nervous system, and peripheral nervous system effects. Workers chronically exposed may exhibit central nervous system depression, intolerance to alcohol, and increased cardiac output. This material is linked to mutagenic effects in humans. This material is also a suspect carcinogen.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, cardiovascular disorders, impaired liver or kidney or respiratory function, or central or peripheral nervous system disorders may be more susceptible to the effects of the substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

---

5. Fire Fighting Measures

Fire:
Autoignition temperature: 420C (788F)
Flammable limits in air % by volume:
lel: 8; uel: 12.5
Explosion:
A strong ignition source, e. g., a welding torch, can produce ignition. Sealed containers may rupture when heated.
Fire Extinguishing Media:

Use water spray to keep fire exposed containers cool. If substance does ignite, use CO2, dry chemical or foam.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

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6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

---

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Trichloroethylene:
-OSHA Permissible Exposure Limit (PEL):
100 ppm (TWA), 200 ppm (Ceiling),
300 ppm/5min/2hr (Max)

-ACGIH Threshold Limit Value (TLV):
10 ppm (TWA) 25 ppm (STEL); A2 Suspected Human Carcinogen.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134). This substance has poor warning properties. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene is a recommended material for personal protective equipment.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Chloroform-like odor.
Solubility:
Practically insoluble in water. Readily miscible in organic solvents.
Specific Gravity:
1.47 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
87C (189F)
Melting Point:
-73C (-99F)
Vapor Density (Air=1):
4.5
Vapor Pressure (mm Hg):
57.8 @ 20C (68F)
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Will slowly decompose to hydrochloric acid when exposed to light and moisture.
Hazardous Decomposition Products:
May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong caustics and alkalis, strong oxidizers, chemically active metals, such as barium, lithium, sodium, magnesium, titanium and beryllium, liquid oxygen.
Conditions to Avoid:
Heat, flame, ignition sources, light, moisture, incompatibles

11. Toxicological Information

Toxicological Data:
Trichloroethylene: Oral rat LD50: 5650 mg/kg; investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
This material has been linked to mutagenic effects in humans.

```
--------\Cancer Lists\---------------------------------------------------
                                      ---NTP Carcinogen---
Ingredient                            Known    Anticipated    IARC Category
------------------------------------  -----    -----------    -------------
Trichloroethylene (79-01-6)            No          Yes             2A
```

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. This material has an experimentally-determined bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.
Environmental Toxicity:
The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be slightly toxic to aquatic life.

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13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TRICHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1710
Packing Group: III
Information reported for product/size: 4L

International (Water, I.M.O.)

Proper Shipping Name: TRICHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1710
Packing Group: III
Information reported for product/size: 4L

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15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                       TSCA  EC   Japan  Australia
-----------------------------------------------  ----  ---  -----  ---------
Trichloroethylene (79-01-6)                       Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                        --Canada--
Ingredient                                       Korea  DSL   NDSL  Phil.
-----------------------------------------------  -----  ---   ----  -----
Trichloroethylene (79-01-6)                       Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                           -SARA 302-    ------SARA 313------
Ingredient                                 RQ    TPQ     List  Chemical Catg.
```

```
  ---------------------------------------  ---   -----   ----  --------------
  Trichloroethylene (79-01-6)              No    No      Yes        No

  --------\Federal, State & International Regulations - Part 2\----------------
                                                      -RCRA-    -TSCA-
  Ingredient                               CERCLA     261.33     8(d)
  ---------------------------------------  ------     ------    ------
  Trichloroethylene (79-01-6)              100        U228       No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Pure / Liquid)
```

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: None allocated.
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS HEART, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES SEVERE SKIN IRRITATION. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat and flame.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician. Note to physician: Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 8.
Disclaimer:
****

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MATHESON TRI-GAS, INC.
150 Allen Road Suite 302
Basking Ridge, New Jersey 07920
Information: 1-800-416-2505

Emergency Contact:
CHEMTREC 1-800-424-9300
Calls Originating Outside the US:
703-527-3887 (Collect Calls Accepted)

SUBSTANCE: CIS-1,2-DICHLOROETHYLENE

TRADE NAMES/SYNONYMS:
CIS-ACETYLENE DICHLORIDE; 1,2-DICHLOROETHYLENE; C2H2CL2; MAT05125; RTECS KV9420000

CHEMICAL FAMILY: halogenated, aliphatic

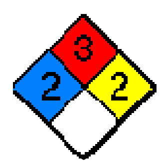
CREATION DATE: Jan 24 1989
REVISION DATE: Sep 13 2007

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: CIS-1,2-DICHLOROETHYLENE
CAS NUMBER: 156-59-2
PERCENTAGE: 100.0

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=3 REACTIVITY=2



EMERGENCY OVERVIEW:
COLOR: colorless
PHYSICAL FORM: liquid
ODOR: pleasant odor
MAJOR HEALTH HAZARDS: respiratory tract irritation, skin irritation, eye irritation, central nervous system depression
PHYSICAL HAZARDS: Flammable liquid and vapor. Vapor may cause flash fire. May react on contact with air, heat, light or water.

POTENTIAL HEALTH EFFECTS:
INHALATION:

SHORT TERM EXPOSURE: irritation, nausea, vomiting, drowsiness, symptoms of drunkenness
LONG TERM EXPOSURE: no information on significant adverse effects
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: same as effects reported in short term exposure
EYE CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: same as effects reported in short term exposure
INGESTION:
SHORT TERM EXPOSURE: symptoms of drunkenness
LONG TERM EXPOSURE: no information on significant adverse effects

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.

NOTE TO PHYSICIAN: For ingestion, consider gastric lavage. Consider oxygen.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Severe fire hazard. Moderate explosion hazard. Vapor/air mixtures are explosive above flash point. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back.

EXTINGUISHING MEDIA: regular dry chemical, carbon dioxide, water, regular foam

Large fires: Use regular foam or flood with fine water spray.

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 800 meters (1/2 mile). Do not attempt to extinguish fire unless flow of material can be stopped first. Flood with fine water spray. Do not scatter spilled material with high-pressure water streams. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Water may be ineffective.

FLASH POINT: 39 F (4 C) (CC)
LOWER FLAMMABLE LIMIT: 9.7%
UPPER FLAMMABLE LIMIT: 12.8%
FLAMMABILITY CLASS (OSHA): IB

6. ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE:
Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry.

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Grounding and bonding required. Keep separated from incompatible substances.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
CIS-1,2-DICHLOROETHYLENE:
1,2-DICHLOROETHYLENE (ALL ISOMERS):
200 ppm (790 mg/m3) OSHA TWA
200 ppm ACGIH TWA
200 ppm (790 mg/m3) NIOSH recommended TWA 10 hour(s)

VENTILATION: Provide local exhaust ventilation system. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
2000 ppm
Any supplied-air respirator operated in a continuous-flow mode.
Any powered, air-purifying respirator with organic vapor cartridge(s).
Any air-purifying respirator with a full facepiece and an organic vapor canister.
Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted organic vapor canister.
Any self-contained breathing apparatus with a full facepiece.
Any supplied-air respirator with a full facepiece.
Emergency or planned entry into unknown concentrations or IDLH conditions -
Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.
Escape -
Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted organic vapor canister.
Any appropriate escape-type, self-contained breathing apparatus.
For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.
Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: liquid
COLOR: colorless
ODOR: pleasant odor
MOLECULAR WEIGHT: 96.94
MOLECULAR FORMULA: C2-H2-CL2
BOILING POINT: 140 F (60 C)
FREEZING POINT: -114 F (-81 C)
VAPOR PRESSURE: 400 mmHg @ 41 C
VAPOR DENSITY (air=1): 3.34
SPECIFIC GRAVITY (water=1): 1.2837
WATER SOLUBILITY: insoluble
PH: Not available
VOLATILITY: Not available
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not available

COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: acetone, benzene, ether, alcohol

10. STABILITY AND REACTIVITY

REACTIVITY: May decompose on contact with air, light, moisture, heat or storage and use above room temperature. Releases toxic, corrosive, flammable or explosive gases.

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.

INCOMPATIBILITIES: bases, metals, combustible materials, oxidizing materials, acids

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: phosgene, halogenated compounds, oxides of carbon

POLYMERIZATION: May polymerize. Avoid contact with incompatible materials.

11. TOXICOLOGICAL INFORMATION

CIS-1,2-DICHLOROETHYLENE:
TOXICITY DATA: 13700 ppm inhalation-rat LC50
LOCAL EFFECTS:
Irritant: inhalation, skin, eye
ACUTE TOXICITY LEVEL:
Slightly Toxic: inhalation
TARGET ORGANS: central nervous system
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: respiratory disorders
MUTAGENIC DATA: Available.

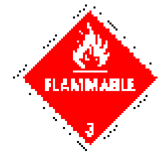
12. ECOLOGICAL INFORMATION

Not available

13. DISPOSAL CONSIDERATIONS

Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. Dispose in accordance with all applicable regulations.

14. TRANSPORT INFORMATION



U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: 1,2-Dichloroethylene
ID NUMBER: UN1150
HAZARD CLASS OR DIVISION: 3
PACKING GROUP: II
LABELING REQUIREMENTS: 3

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
SHIPPING NAME: 1,2-Dichloroethylene
UN NUMBER: UN1150
CLASS: 3
PACKING GROUP/RISK GROUP: II

15. REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): Not regulated.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):
ACUTE: Yes
CHRONIC: No
FIRE: Yes
REACTIVE: Yes
SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65):
1,2-DICHLOROETHYLENE (ALL ISOMERS)

OSHA PROCESS SAFETY (29CFR1910.119): Not regulated.

STATE REGULATIONS:
California Proposition 65: Not regulated.

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: BD2

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CANADA INVENTORY (DSL/NDSL): Not determined.

16. OTHER INFORMATION

MSDS SUMMARY OF CHANGES
8. EXPOSURE CONTROLS, PERSONAL PROTECTION

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NFPA RATING

FLAMMABILITY

HEALTH

REACTIVITY

MATERIAL SAFETY

DATA SHEET

OTHER

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

PART I *What is the material and what do I need to know in an emergency?*

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS:	**VINYL CHLORIDE - CH_2CHCl** Document Number: 001067
PRODUCT USE:	For general analytic/synthetic chemical uses.
SUPPLIER/MANUFACTURER'S NAME: ADDRESS:	AIRGAS INC. 259 N. Radnor-Chester Road Suite 100 Radnor, PA 19087-5283
BUSINESS PHONE:	1-610-687-5253

EMERGENCY PHONE:	1-800-949-7937 International: 423-479-0293
DATE OF PREPARATION: REVISION DATE:	November 20, 1997 January 3, 2001

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA		IDLH	OTHER
			TLV ppm	STEL ppm	PEL ppm	STEL ppm	ppm	
Vinyl Chloride	75-01-4	> 99.9%	5, A1 (Confirmed Human Carcinogen)	NE	1	5, C (15 minutes)	NE	NIOSH: Carcinogen; Reduce exposure to lowest feasible level. Carcinogen: IARC-1; MAK-A1; NTP-1; OSHA-X; NIOSH-X
Maximum Impurities		< 0.1%	None of the trace impurities in this product contribute significantly to the hazards associated with the product. All hazard information pertinent to this product has been provided in this Material Safety Data Sheet, per the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200) and State equivalent standards.					

NE = Not Established C = Ceiling Limit See Section 16 for Definitions of Terms Used NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: Vinyl Chloride is a colorless, liquefied, toxic, flammable gas with a sweet, ethereal odor. Vinyl Chloride is a known human carcinogen and is toxic by all routes of exposure. Contact with the skin and eyes will result in irritation. Inhalation of Vinyl Chloride may produce symptoms of drowsiness, blurred vision, staggering gait and tingling and numbness in the extremities. Contact with the liquid may result in frostbite. Both the liquid and gas pose a serious fire hazard when accidentally released. Vinyl Chloride polymerizes readily when exposed to air, sunlight, heat or oxygen and so can form dangerous explosive air/gas mixtures. Flame or high temperature impinging on a localized area of the cylinder of Vinyl Chloride can cause the cylinder to rupture without activating the cylinder's relief devices. Provide adequate fire protection during emergency response situations.

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: The most significant routes of overexposure for Vinyl Chloride are by inhalation or skin and eye contact. The following paragraphs describe symptoms of exposure by route of exposure.

INHALATION: Vinyl Chloride acts as a general anesthetic in concentrations over 500 ppm. Overexposure to low levels of Vinyl Chloride will result in dizziness, light-headedness, euphoria, nervousness, drowsiness, headache, blurred vision, impaired hearing and confusion. Acute exposures to 1000 ppm will slowly produce symptoms such as staggering gait and tingling in the hands and feet.

Overexposure to extremely high concentrations (greater than 70,000 ppm) of Vinyl Chloride may cause unconsciousness and death, with possible liver, spleen, and kidney damage.

SKIN CONTACT: The gas is mildly irritating to exposed skin. Accidental spraying of the liquid gas may cause burns from freezing, due to rapid evaporation.

EYE CONTACT: Vinyl Chloride gas is mildly irritating to the eyes. Accidental spraying of the liquid into the eye(s) may cause burns from freezing, due to rapid evaporation.

OTHER POTENTIAL HEALTH EFFECTS: Contact with liquid or rapidly expanding gases (which are released under high pressure) may cause frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after such contact can quickly subside.

HAZARDOUS MATERIAL INFORMATION SYSTEM

HEALTH (BLUE)	2
FLAMMABILITY (RED)	4
REACTIVITY (YELLOW)	2
PROTECTIVE EQUIPMENT	X

EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8

For routine industrial applications

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation **See Section 16 for Definition of Ratings** in Lay Terms. Overexposure to Vinyl Chloride may cause the following health effects:

ACUTE: The most significant hazard associated with Vinyl Chloride is inhalation of vapors, which can produce symptoms of central nervous system depression, such as dizziness, light-headedness, headache, nervousness confusion and impairment of vision and hearing. Overexposure to extremely high concentrations may cause unconsciousness and death, with possible liver, spleen, and kidney damage. Contact with liquid or rapidly expanding gases may cause frostbite.

CHRONIC: Long-term exposure to low levels of Vinyl Chloride causes angiosarcoma of the liver, which is a rare form of liver cancer. Chronic exposure to Vinyl Chloride has been associated with cancers of the brain, lungs and blood-forming and lymphatic systems. In the past, chronic exposure to high levels of Vinyl Chloride has resulted in acro-osteolysis (a type of degenerative bone disease) and reports of increased frequency of chromosomal changes. These symptoms have been reduced significantly due to current stringent handling procedures. Refer to Section 11 (Toxicology Information) of this MSDS for additional information.

TARGET ORGANS: Central nervous system, liver, spleen, kidneys, respiratory system and, potentially, the reproductive system.

PART II *What should I do if a hazardous situation occurs?*

4. FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO VINYL CHLORIDE WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus and Fire-Retardant Personal Protective equipment should be worn. Adequate fire protection must be provided during rescue situations.

Remove victim(s) to fresh air, as quickly as possible. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary.

SKIN EXPOSURE: Immediately flush affected area with water for at least 15 minutes. Contact with the liquid or rapidly expanding gases can cause frostbite. In the event of frostbite, medical attention must be sought. Frozen tissue is painless and appears waxy, with a possible yellow color. Frozen tissue will become swollen, painful and prone to infection when thawed. If the frozen part of the body has been thawed by the time medical attention has been obtained, cover the area with a dry sterile dressing and a large bulky protective covering.

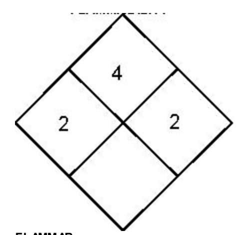
EYE EXPOSURE: In the event of contact with the eyes, flush the affected eye(s) with running water for at least 15 minutes. Victims of eye exposure should be taken to medical attention immediately.

5. FIRE-FIGHTING MEASURES

FLASH POINT (Open Cup): -77.8°C (-108°F)

AUTOIGNITION TEMPERATURE: 472.0°C (881.6°F)

NFPA RATING



FLAMMABLE LIMITS (in air by volume, %): Lower (LEL): 4.0% Upper (UEL): 22.0%

FIRE EXTINGUISHING MATERIALS: Extinguish Vinyl Chloride fires by shutting off the source of the gas. Water spray should be used to cool fire-exposed containers, structures and equipment. Use carbon dioxide, foam or dry chemicals as extinguishing media, if possible.

See Section 16 for Definition of Ratings

UNUSUAL FIRE AND EXPLOSION HAZARDS: Extremely flammable gas. Very dangerous fire hazard when exposed to heat, flame or powerful oxidizers. If stored for prolonged periods of time in the absence of sufficient polymerization inhibitor, dangerous peroxide compounds may form by oxidization with atmospheric oxygen in the presence of various contaminants. Contact with metals such as copper, aluminum and certain catalytic impurities can cause violent polymerization. Explosion hazard in confined spaces. During a fire, toxic gases (i.e. hydrogen chloride, carbon dioxide, carbon monoxide, and traces of phosgene) may be produced.

DANGER! Fires impinging (direct flame) on the outside surface of unprotected cylinders of Vinyl Chloride can be very dangerous. Exposure to fire could cause a catastrophic failure of the cylinder releasing the contents into a fireball and explosion of released gas. The resulting fire and explosion can result in severe equipment damage and personnel injury or death over a large area around the cylinder. For massive fires in large areas, use unmanned hose holder or monitor nozzles; if this is not possible, withdraw from area and allow fire to burn.

Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: Static discharge may cause Vinyl Chloride to ignite explosively.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Because of the potential for a BLEVE, evacuation of non-emergency personnel is essential. If the flow of gas cannot be stopped, it is better to allow the gas to burn rather than form potentially explosive air/gas hazard. If the fire is extinguished before the flow of gas can be stopped, the gas can explosively re-ignite. If water is not available for cooling or protection of cylinder exposures, evacuate the area. Refer to the North American Emergency Response Guidebook (Guide #116P) for additional information.

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Evacuate immediate area. Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a gas release, clear the affected area, protect people, and respond with trained personnel.

Eliminate any possible sources of ignition, and provide maximum explosion-proof ventilation. If the gas is leaking from cylinder or valve, contact the supplier. Adequate fire protection must be provided. Use only non-sparking tools and equipment during the response.

Minimum Personal Protective Equipment should be **Level B: fire-retardant protective clothing, gloves and Self-Contained Breathing Apparatus.** Use only non-sparking tools and equipment.

Locate and seal the source of the leaking gas. Protect personnel attempting the shut-off with water-spray. Allow the gas to dissipate. Combustible gas concentration must be below 10% of the LEL (4%) prior to entry. Monitor the surrounding area for combustible gas levels and oxygen level. The atmosphere must have levels of Vinyl Chloride below those listed in Section 2 (Information and Composition on Ingredients) and at least 19.5 percent oxygen before personnel can be allowed in the area without Self-Contained Breathing Apparatus. Attempt to close the main source valve prior to entering the area. If this does not stop the release (or if it is not possible to reach the valve), allow the gas to release in-place or remove it to a safe area and allow the gas to be released there.

THIS IS AN EXTREMELY FLAMMABLE GAS, WHICH IS ALSO TOXIC AND A KNOWN HUMAN CARCINOGEN.
Protection of all personnel and the area must be maintained.

PART III *How can I prevent hazardous situations from occurring?*

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting Vinyl Chloride IN YOU. Do not eat or drink while handling chemicals. Be aware of any signs of exposure as indicated in Section 2 (Composition and Information on Ingredients); exposures to fatal concentrations of Vinyl

Chloride could occur rapidly.

NOTE: Refer to the OSHA Vinyl Chloride Standard (29 CFR 1910.1017) for specific requirements associated with the use of this gas. The Action Level for Vinyl Chloride is 0.5 ppm. In workplaces where employees are exposed above the Action Level, the OSHA requirements for monitoring, establishment of regulated areas, methods of compliance, respiratory protection, emergency response protocol, medical surveillance, training, and record-keeping must be followed.

STORAGE AND HANDLING PRACTICES: Entrances to regulated areas (as defined by the OSHA Vinyl Chloride Standard) must be posted with legible signs which reads as follows:

CANCER-SUSPECT AGENT AREA

AUTHORIZED PERSONNEL ONLY

Vinyl Chloride should be used in a well-ventilated area, preferably in a hood with forced ventilation. Store in cool, dry, well-ventilated area, away from sources of heat, ignition and direct sunlight. Do not allow area where cylinders are stored to exceed 52°C (125°F). Cylinders should be separated from oxygen cylinders, or other oxidizers, by a minimum distance of 20 ft., or by a barrier of non-combustible material at least 5 ft. high, having a fire-resistance rating of at least
0.5 hours. Isolate from other incompatible chemicals (refer to Section 10, Stability and Reactivity).

Storage areas must meet national electrical codes for Class 1 Hazardous Areas. Post “No Smoking or Open Flames” signs in storage or use areas. Consider installation of leak detection and alarm for storage and use areas. Have appropriate extinguishing equipment in the storage area (i.e. sprinkler system, portable fire extinguishers). This gas is heavier than air and will accumulate in low areas. Do not store below ground level.

Steel is recommended for all piping, storage tanks and equipment used with Vinyl Chloride. Copper and its alloys and aluminum should never be used in equipment used with Vinyl Chloride due to the potential for violent polymerization with these materials.

Keep the smallest amount on-site as is necessary. Full and empty cylinders should be segregated. Use a first-in, first-out inventory system to prevent full containers from being stored for long periods of time.

7. HANDLING and STORAGE (Continued)

STORAGE AND HANDLING PRACTICES (continued): Use non-sparking ventilation systems, approved explosion-proof equipment, and appropriate electrical systems. Electrical equipment used in gas-handling operations, or located in storage areas, should be non-sparking or explosion proof. Use a check valve in the discharge line to prevent hazardous backflow. Never tamper with pressure relief devices in valves and cylinders.

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: Protect cylinders against physical damage. Use a check valve or trap in the discharge line to prevent hazardous backflow. Cylinders should be stored upright and be firmly secured to prevent falling or being knocked over. Cylinders can be stored in the open, but in such cases, should be protected against extremes of weather and from the dampness of the ground to prevent rusting. Never tamper with pressure relief devices in valves and cylinders. Electrical equipment should be non-sparking or explosion proof. The following rules are applicable to work situations in which cylinders are being used:

Before Use: Move cylinders with a suitable hand-truck. Do not drag, slide or roll cylinders. Do not drop cylinders or permit them to strike each other. Secure cylinders firmly. Leave the valve protection cap, if provided, in-place until cylinder is ready for use. **During Use:** Use designated CGA fittings and other support equipment. Do not use adapters. Do not heat cylinder by any means to increase the discharge rate of the product from the cylinder. Use check valve or trap in discharge line to prevent hazardous backflow into the cylinder. Do not use oils or grease on gas-handling fittings or equipment. **After Use:** Close main cylinder valve. Replace valve protection cap, if provided. Mark empty cylinders “EMPTY”.

NOTE: Use only DOT or ASME code containers. Earth-ground and bond all lines and equipment associated with Vinyl Chloride. Close valve after each use and when empty. Cylinders must not be recharged except by or with the consent of owner. For additional information refer to the Compressed Gas Association Pamphlet P-1, *Safe Handling of Compressed Gases in Containers*. Additionally, refer to CGA Bulletin SB-2 "*Oxygen Deficient Atmospheres*".

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Purge gas handling equipment with inert gas (i.e. nitrogen) before attempting repairs.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation. A hood with forced ventilation is preferred, due to the significant toxicity and flammability hazards of Vinyl Chloride. Installation of automatic monitoring equipment to detect the level of Vinyl Chloride and potentially explosive air-gas mixtures is highly recommended.

RESPIRATORY PROTECTION: Maintain exposure levels of Vinyl Chloride below the levels listed in Section 2 (Composition and Information on Ingredients) and oxygen levels above 19.5% in the workplace. During an emergency situation, before entering the area, check for flammable gas level as well as oxygen-deficient atmospheres. Use supplied air respiratory protection if Vinyl Chloride levels exceed exposure limits and if oxygen level is below 19.5% or during emergency response to a release of Vinyl Chloride. If respiratory protection is required, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), or equivalent State standards. The following are NIOSH recommendations for respiratory protection for concentration of Vinyl Chloride in air.

CONCENTRATION	RESPIRATORY EQUIPMENT
AT ANY DETECTABLE CONCENTRATION:	Positive pressure, full-facepiece Self-Contained Breathing Apparatus (SCBA) or positive pressure, full-facepiece Supplied Air Respirator (SAR) with an auxiliary positive pressure SCBA.
ESCAPE:	Gas mask with canister to protect against Vinyl Chloride, or escape-type SCBA.

NOTE: Follow the specific respiratory selection guidelines of the OSHA Vinyl Chloride Standard in regulated areas (as defined by 29 CFR 1910.1017).

EYE PROTECTION: Splash goggles or safety glasses and face shield when handling the liquid or gas.

HAND PROTECTION: Wear leather gloves when handling cylinders of Vinyl Chloride. Chemical resistant gloves should be worn when using Vinyl Chloride.

BODY PROTECTION: Use body protection appropriate for task. Chemical resistant material is recommended for protection against contamination with Vinyl Chloride. Safety shoes are recommended when handling cylinders. Response to leaks requires the use of fire retardant clothing. Transfer of large quantities under pressure may require protective equipment appropriate to protect employees from gas spraying, as well as fire-retardant items.

9. PHYSICAL and CHEMICAL PROPERTIES

GAS DENSITY @ 21.1°C (70°F) and 1 atm: 0.160 lb/ft^3 (2.56 kg/m^3)
LIQUID DENSITY @ 21.1°C (70°F) and 1 atm: 56.71 lb/ft^3 (908.41 kg/m^3)

SPECIFIC GRAVITY @ 15°C (59°F) air = 1: 2.15	BOILING POINT @ 1 atm: -13.4°C (7.93°F)
EVAPORATION RATE (nBuAc = 1): Not applicable.	pH: Not applicable.

FREEZING/MELTING POINT @ 1 atm: -153.9°C (-245°F)	VAPOR PRESSURE @ 21.1°C (70°F) psig: 35.3
EXPANSION RATIO: Not applicable.	ODOR THRESHOLD: 2000 ppm

SOLUBILITY IN WATER wt/wt @ 1 atm/25°C (77°F): 0.00114 SPECIFIC VOLUME (ft^3/lb): 6.25 COEFFICIENT WATER/OIL DISTRIBUTION: Log K_{ow} = 0.6 (calculated).

APPEARANCE AND COLOR: Colorless gas with a sweet, ethereal odor.

HOW TO DETECT THIS SUBSTANCE (warning properties): The odor is not a reliable warning property. In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation.

10. STABILITY and REACTIVITY

STABILITY: Stable with polymerization inhibitor. Without an inhibitor, storage for prolonged periods of time can form potentially hazardous peroxides by oxidization with atmospheric oxygen in the presence of a variety of contaminants.

DECOMPOSITION PRODUCTS: Decomposition products of Vinyl Chloride include the following toxic gases: carbon monoxide, carbon dioxide and hydrogen chloride gas and trace amounts of phosgene.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Vinyl Chloride is incompatible with strong oxidizers, copper and its alloys, aluminum, certain catalytic impurities, oxides of nitrogen. Vinyl Chloride can react violently with all these materials.

HAZARDOUS POLYMERIZATION: Hazardous polymerization can occur in the presence of air, sunlight or heat. Vinyl Chloride can cause violent polymerization in the presence of strong oxidizers. Vinyl Chloride also polymerizes violently upon contact with copper and its alloys, aluminum and certain catalytic impurities.

CONDITIONS TO AVOID: Contact with incompatible materials and exposure to heat, sparks and other sources of ignition. Cylinders exposed to high temperatures or direct flame can rupture or burst.

PART IV *Is there any other useful information about this material?*

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following information is for Vinyl Chloride (gas).

Microsomal Mutageniticity Assay-Salmonella typhimurium 1 pph Inhalation-Mouse TCLo: 50 ppm/30 weeks: Carcinogenic effects Cytogenetic Analysis-Human: HeLa cell 10 mmol/L Inhalation-Hamster TCLo: 50 ppm/4H/30 weeks: Carcinogenic effects Inhalation-Man TCLo: 30 mg/m^3 (5 years male): Reproductive effects Inhalation-Rat TC: 50 ppm/7H/26 weeks: Carcinogenic effects Inhalation-Man TCLo: 200 ppm/14 years: Carcinogenic effects, Inhalation-Rat TC: 100 ppm/7H/26 weeks: Carcinogenic effects Oral-Rat TDLo: 1 ppm/4 hours and 3463 mg/kg/52 weeks, intermittent: Inhalation-Mouse TC: 50 ppm/47 weeks I: Carcinogenic effects

Carcinogenic effects Oral-Rat TD: 34 g/kg/3 years, Intermittent: Carcinogenic effects Inhalation-Rat TCLo: 10,000 ppm/4 hours (12-18 days preg): Inhalation-Mouse TC: 50 ppm/6H/4 weeks: Carcinogenic effects

Carcinogenic effects, Teratogenic effects Inhalation-Mouse TC: 50 ppm/4H/30 weeks: Carcinogenic effects Intraperitoneal-Rat TDLo: 21 mg/kg/65 weeks, intermittent: Equivocal Inhalation-Rat TC: 250 ppm/2 Years, Intermittent: Carcinogenic effects

tumorigenic agent Inhalation-Human TC: 300 mg/m3/ weeks: Carcinogenic effects, Blood Subcutaneous-Rat TDLo: 21 mg/kg/6765 weeks, intermittent: Equivocal effects

tumorigenic agent Inhalation-Rat TC: 5 ppm/4H/52 weeks: Carcinogenic effects Oral-Rat LD_{50}: 500 mg/kg Inhalation Rat TC: 50 ppm/6H-43 weeks: Carcinogenic effects

SUSPECTED CANCER AGENT: Vinyl Chloride is a known human carcinogen, which is listed by the following agencies: IARC-1 (Carcinogenic to Humans); MAK-A1(Capable of Inducing Malignant Tumors/Human Evidence); NTP-1 (Known to be a Carcinogen); OSHA-X (Carcinogen); ACGIH-A1 (Confirmed Human Carcinogen); NIOSH-X (Carcinogen); Cal-OSHA (Carcinogen).

IRRITANCY OF PRODUCT: Vinyl Chloride can be mildly irritating to eyes and skin. Contact with the liquid or rapidly expanding gases can cause frostbite to exposed tissue.

SENSITIZATION TO THE PRODUCT: Vinyl Chloride is not known to be a sensitizer to humans upon prolonged or repeated contact.

11. TOXICOLOGICAL INFORMATION (Continued)

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of Vinyl Chloride on the human reproductive system.

Mutagenicity: Human mutation data are reported for Vinyl Chloride.
Embryotoxicity: There is insufficient evidence currently available to categorize Vinyl Chloride as embryotoxic to humans.
Teratogenicity: There is insufficient evidence currently available to categorize Vinyl Chloride as teratogenic to humans.
Reproductive Toxicity: Vinyl chloride is reported to produce adverse effects on the human reproductive system (i.e.

changes in spermatogenesis).

A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Conditions relating to the target organs may be aggravated by overexposures to Vinyl Chloride. See Section 3 (Hazard Identification) for information on these conditions.

RECOMMENDATIONS TO PHYSICIANS: Administer oxygen, if necessary. Treat symptoms and eliminate exposure. Refer to the OSHA Vinyl Chloride Standard (29 CFR 1910.1017; paragraph K and Appendix A) for specific information on Medical Surveillance requirements (i.e. for the general physical exam, medical history, serum specimens, specific tests, and re-examination protocol).

BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, Biological Exposure Indices (BEIs) are not applicable for Vinyl Chloride.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: This gas will be dissipated rapidly in well-ventilated areas. There are limited data indicating the Vinyl Chloride is resistant to biodegradation in aerobic systems. Evaporation half-life from water is 0.45-2.5 hours.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: This gas can be harmful to animal life. Suspected toxic effects on a variety of test animals during clinical studies indicate adverse effects on the central nervous system and liver. Plants may be damaged by frost produced in the presence of rapidly expanding gases. Additional data on the effects of Vinyl Chloride on plants are available as follows:

Increased production of hydrogen peroxide in germinating seeds exposed to Vinyl Chloride gas decreased their sulfhydryl content and thereby
produced adverse effects and abnormalities in growth. Threshold levels of Vinyl Chloride were greater than 200 ppm and saturation level was
1000 ppm.

EFFECT OF CHEMICAL ON AQUATIC LIFE: The effect of Vinyl Chloride effects on aquatic life is not fully known. The following data are available for Vinyl Chloride.

Estimated Bioconcentration Factor of 7. Reported water solubility of 2,700 mg/L. Based on the BCF, Vinyl Chloride is not expected to significantly bioconcentrate in aquatic organisms.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, and local regulations. Return cylinders with residual product to Airgas. Do not dispose locally.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF

TRANSPORTATION.

PROPER SHIPPING NAME:	Vinyl chloride, inhibited
HAZARD CLASS NUMBER and DESCRIPTION:	2.1 (Flammable Gas)
UN IDENTIFICATION NUMBER:	UN 1086
PACKING GROUP:	Not Applicable
DOT LABEL(S) REQUIRED:	Flammable Gas (Note: Per the requirements of the OSHA Vinyl

Chloride Standard, 29 CFR 1910.1017, the additional legend "Cancer-Suspect Agent" must be applied near the label or placard).

11. TOXICOLOGICAL INFORMATION (Continued)

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2000): 116P

MARINE POLLUTANT: Vinyl Chloride is not classified by the DOT as a Marine Pollutant (as defined by 49 CFR
172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS

CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

15. REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS: Vinyl Chloride is subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act, as follows:

COMPONENT	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Vinyl Chloride	NO	YES	YES

U.S. SARA THRESHOLD PLANNING QUANTITY: Not applicable.
U.S. CERCLA REPORTABLE QUANTITY (RQ): Vinyl Chloride = 1 lb.
CANADIAN DSL INVENTORY: Vinyl Chloride is listed on the DSL Inventory.

U.S. TSCA INVENTORY STATUS: Vinyl Chloride is listed on the TSCA Inventory.

OTHER U.S. FEDERAL REGULATIONS: Vinyl Chloride is regulated under 28 CFR 1910.1017 (OSHA Vinyl Chloride Standard). Vinyl Chloride is subject to the reporting requirements of Section 112(r) of the Clean Air Act. The Threshold Quantity for this gas is 10,000 pounds. Depending on specific operations involving the use of Vinyl Chloride, the regulations of the Process

Safety Management of Highly Hazardous Chemicals may be applicable (29 CFR 1910.119). Under this regulation Vinyl Chloride is listed in Appendix A of this Standard and the threshold quantity for Vinyl Chloride is 15,000 pounds.
U.S. STATE REGULATORY INFORMATION: Vinyl Chloride is covered under specific State regulations, as denoted

below:

Alaska - Designated Toxic and Hazardous Substances: Vinyl Chloride.

California -Permissible Exposure Limits for Chemical Contaminants: Vinyl Chloride.

Florida - Substance List: Vinyl Chloride.

Illinois -Toxic Substance List: Vinyl Chloride.

Kansas - Section 302/313 List: Methyl Chloride.

Massachusetts -Substance List: Vinyl Chloride.

Michigan -Critical Materials Register: Vinyl Chloride.

Minnesota - List of Hazardous Substances: Vinyl Chloride.

Missouri -Employer Information/Toxic Substance List: Vinyl Chloride.

New Jersey -Right to Know Hazardous Substance List: Vinyl Chloride.

North Dakota -List of Hazardous Chemicals, Reportable Quantities: Vinyl Chloride.

Pennsylvania - Hazardous Substance L Vinyl Chloride.

Rhode Island - Hazardous Substance Li Vinyl Chloride.

Texas -Hazardous Substance List: V Chloride.

West Virginia - Hazardous Substance L Vinyl Chloride.

Wisconsin - Toxic and Hazard Substances: Vinyl Chloride.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): Vinyl Chloride is on the Proposition 65 lists. WARNING: Contains a chemical known to the State of California to cause cancer.

LABELING:

DANGER: CANCER SUSPECT AGENT.

FLAMMABLE LIQUID AND GAS UNDER PRESSURE.
CAN FORM EXPLOSIVE MIXTURES WITH AIR.
MAY CAUSE LIVER, KIDNEY, SPLEEN AND OTHER ORGAN DAMAGE.
MAY CAUSE IRRITATION TO EYES, SKIN, AND MUCOUS MEMBRANES.
MAY CAUSE FROSTBITE.

Do not breathe gas.
Do not get liquid in skin, in eyes, or on clothing.
Keep away from heat, flames, and sparks.
Store and use with adequate ventilation in closed systems.
Cylinder temperature should not exceed 52°C (125°F).
Close valve after each use and when empty.
Use in accordance with the Material Safety Data Sheet.

15. REGULATORY INFORMATION (Continued)

LABELING (continued):

NOTE: Suck-back into cylinder may cause rupture.

Always use a back flow preventative device in piping.

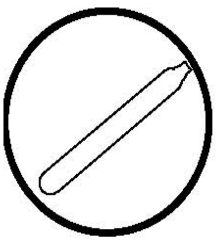
FIRST-AID: **IF INHALED:** Remove to fresh air. If not breathing, give artificial respiration, If breathing is difficult, give oxygen, Call a physician.

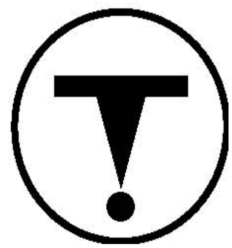
IN CASE OF CONTACT, immediately flush eyes or skin with water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse. (Discard contaminated shoes)

IN CASE OF FROSTBITE, obtain immediate medical attention.

DO NOT REMOVE THIS PRODUCT LABEL.

<u>CANADIAN WHMIS SYMBOLS</u>: **Class A:** Compressed Gas. **Class B1:** Flammable Gas **Class D1B** Materials Causing Immediate and Serious Toxic Effects **Class D2A:** Other Toxic Material



16. OTHER INFORMATION PREPARED BY: Airgas - SAFECOR

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. AIRGAS, Inc. assumes no responsibility for injury to the vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, AIRGAS, Inc. assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

CAS #: This is the Chemical Abstract Service Number which uniquely identifies each constituent. It is used for computer-related searching.

EXPOSURE LIMITS IN AIR: ACGIH -American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. **TLV - Threshold Limit Value** -an airborne concentration of a substance which represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8hour **Time Weighted Average (TWA)**, the 15-minute **Short Term Exposure Limit**, and the instantaneous **Ceiling Level**. Skin absorption effects must also be considered. **OSHA** - U.S. Occupational Safety and Health Administration. **PEL -Permissible Exposure Limit** - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, “Vacated 1989 PEL,” is placed next to the PEL which was vacated by Court Order. **IDLH -Immediately Dangerous to Life and Health -** This level represents a concentration from which one can escape within 30minutes without suffering escape-preventing or permanent injury. **The DFG - MAK** is the Republic of Germany’s Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. **O**ccupational **S**afety and **H**ealth **A**dministration (**OSHA**). NIOSH issues exposure guidelines called **R**ecommended **E**xposure **L**evels (**REL**s). When no exposure guidelines are established, an entry of **NE** is made for reference.

HAZARD RATINGS: HAZARDOUS MATERIALS IDENTIFICATION SYSTEM: <u>Health Hazard</u>: **0** (minimal acute or chronic exposure hazard); **1** (slight acute or chronic exposure hazard); **2** (moderate acute or significant chronic exposure hazard); **3** (severe acute exposure hazard; onetime overexposure can result in permanent injury and may be fatal); **4** (extreme acute exposure hazard; onetime overexposure can be fatal). Flammability Hazard: **0** (minimal hazard); **1** (materials that require substantial pre-heating before burning); **2** (combustible liquid or solids; liquids with a flash point of 38-93°C [100-200°F]); **3** (Class IB and IC flammable liquids with flash points below 38°C [100°F]); **4** (Class IA flammable liquids with flash points below 23°C [73°F] and boiling points below 38°C [100°F]. <u>Reactivity Hazard</u>: **0** (normally stable); 1 (material that can become unstable at elevated temperatures or which can react slightly with water); **2** (materials that are unstable but do not detonate or which can react violently with water); **3** (materials that can detonate when initiated or which can react explosively with water); **4** (materials that can detonate at normal temperatures or pressures). **NATIONAL FIRE PROTECTION ASSOCIATION:** Health Hazard: **0** (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury); **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure could cause death or major residual injury). <u>Flammability Hazard and Reactivity Hazard</u>: Refer to definitions for “Hazardous Materials Identification System”. **FLAMMABILITY LIMITS IN AIR**: Much of the information related to fire and explosion is derived from the **N**ational **F**ire **P**rotection **A**ssociation (**NFPA**). <u>Flash Point</u> Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. <u>Autoignition Temperature</u>: The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:

Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD_{50}** Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC_{50}** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m^3** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Data from several sources are used to evaluate the cancer-causing potential of the material. The sources are: **IARC** -the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause death. **BEI** - Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

REGULATORY INFORMATION:

This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. **Superfund Amendments and Reauthorization Act (SARA)**; the **Canadian Domestic Substances List (DSL)**; the U.S. **Toxic Substance Control Act (TSCA)**; Marine Pollutant status according to the **DOT**; California's Safe Drinking Water Act (**Proposition 65**); the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund)**; and various state regulations. This section also includes information on the precautionary warnings which appear on the material’s package label.

APPENDIX O

COMMUNITY RELATIONS PLAN

COMMUNITY RELATIONS PLAN

MICHIGAN PLAZA
3801-3823 WEST MICHIGAN STREET
INDIANAPOLIS, INDIANA
MUNDELL PROJECT NO. M01046
VRP SITE # 6061202

Prepared for:

Indiana Department of Environmental Management
Voluntary Remediation Program
Attention: Mr. Corey Webb
P.O. Box 6015
Indianapolis, Indiana 46206-6015

September 18, 2013

Prepared by:

MUNDELL & ASSOCIATES, INC.
110 South Downey Avenue
Indianapolis, Indiana 46219-6406
317-630-9060, fax 317-630-9065
http://www.MundellAssociates.com

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Project Overview

The above referenced Site has been accepted into the Voluntary Remediation Program (VRP) under reference number 6061202. Based on the recommendation of the Risk Integrated System of Closure (RISC) User's Guide, under which the Site's VRP activities fall, a Remediation Work Plan has been completed. Pursuant to IC 13-25-7, this document serves as the Community Relations Plan, prepared in accordance with the Indiana Department of Environmental Management's (IDEM) Office of Land Quality nonrule policy document Waste-0049-NPD. The purpose of the plan is to ensure the surrounding community will continue to be made aware of the history, status of the project, and remediation activities at the above-referenced Site so that there continues to be community participation and attentive response to public questions. The following plan has been formalized to document community relations that have been completed to date and to update and enhance such communication such that that the ultimate goal of protecting human health and environmental quality is met and understood.

The Site is located in a mixed residential/commercial area on the near west side of Indianapolis. It is located east of the intersection of Michigan Street and Holt Road in Indianapolis, Indiana. The Michigan Plaza consists of a single story, 'L' shaped commercial building with a number of retail and office tenants and asphalt-paved parking lots on approximately 1.5 acres of land. The Plaza currently consists of the Michigan Food Mart Convenience Store (3801), the Kids-X-Clusive daycare facility (3807/3809), the West Michigan Street Veterinary Clinic (3811), an Alcoholics Anonymous office (3817), the Iglesia Arca de Salvacion (3819), and the Michigan Plaza Family Laundry (3823). The Maple Creek Village Apartments currently consists of 23 apartment buildings and one swimming pool, of which only three apartment buildings are part of the Site area this RWP specifically addresses: Apartment Building No. 1, Apartment Building No. 6, and Apartment Building No. 10. Soil, groundwater and air investigations have revealed that previous owner's tenants released chemicals at and around the Site known as chlorinated solvents; tetrachloroethylene or perchloroethylene (PCE), tricholoroethylene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride (VC).

1.1 Community Relations to Date

AIMCO Michigan Meadows Holdings, LLC (AMMH) previously owned the two properties at the time the pre-existing environmental impacts associated with historic tenant site activities were first identified. AMMH initiated the subsequent environmental investigative and remedial activities to address the environmental conditions, and maintains this oversight role to date.

As the observance of such solvents was confirmed, AMMH initiated communication either directly or through their environmental consultant, Mundell

& Associates, Inc. (MUNDELL) to the tenants and property owners. This communication has been maintained to date. The property manager was contacted by MUNDELL prior to every field event to discuss the work to be performed.

The following public outreach efforts are summarized below, some of which are provided in **Attachment A -**

- Letter to the Residents (*March 12, 2003*) of Michigan Meadows Apartments informing them of possible groundwater contamination, and assurance that their drinking water comes from the City of Indianapolis and NOT from the groundwater source. This letter also informed the residents of a public meeting scheduled on March 19, 2003 at Michigan Plaza as an opportunity to discuss the situation.

- Letter to the Residents (*April 15, 2003*) of Michigan Meadows Apartments notifying them of indoor air testing as discussed in the March 19, 2003 public meeting (English and Spanish versions of the letter were circulated – provided in **Attachment A**).

- Letter to the Residents (*July 7, 2003*) of Michigan Meadows Apartments summarizing the air sampling results, and stating that IDEM and Marion County Health Department (MCHD) have stated that no immediate health concerns are present. This letter also mentioned another upcoming public meeting to address any concerns. (English and Spanish versions).

- Letter to the basement apartment residents (*July 7, 2003*) of Michigan Meadows Apartments summarizing the air sampling results, also offering three *relocation options* for anyone having concerns about exposure to any potential health threats (English and Spanish versions).

- Letter to the Michigan Plaza tenants (*July 16, 2003*) summarizing the air sampling results, also offering release from the terms of the lease for anyone having concerns about exposure to any potential health threats. This correspondence is provided in **Attachment A**

- Minutes of the residents' meeting (*March 19, 2003*) regarding Genuine Parts Company Environmental Cleanup are provided in **Attachment A**.

- Attempts to contact the 'Floral Park Cemetery' and initiate communication from September to October 2005 are documented in **Attachment A.**

- Request to the cemetery (*May 18, 2007*) regarding permission for property access and monitoring well installation as required by IDEM.

- Brief Summary of MUNDELL'S meeting with Mr. Ted Mau, President, Washington Park Cemetery *(July 25, 2007)* discussing installation of a monitoring well on their property.

- Letter to the cemetery contractor, Marten Construction Management (*August 22, 2007*) regarding their contact with potentially impacted soils during sewer tie-in activities, offering MUNDELL and IDEM's cooperative provision of safety monitoring and soil waste disposal direction. A copy of this letter is provided in **Attachment A**.

- Attempted to contact Ms. Aferonica Cox, resident at 3817 West Michigan Street, on several occasions from August 25, 2011 to May 31, 2012 to request permission to conduct indoor vapor sampling as requested by IDEM.

- Direct contact on December 21, 2011 and May 31, 2013 with Burton and Iva Olmstead, resident at 3855 West Michigan Street, to request permission to conduct indoor vapor sampling as requested by IDEM.

- Direct contact on May 31, 2012 with Karen Helton, resident at 3839 West Michigan Street, to request permission to conduct indoor vapor sampling as requested by IDEM.

1.2 Current Remediation Status

Under the approval and support of IDEM, MUNDELL has proceeded with a scientific way to remediate these chemicals and cleanup the Site in a way that is least disruptive and certainly safe to the public.

The Site's groundwater is currently being remediated by the injection of CAP18ME™, a bioremediation product consisting essentially of food-grade soybean oil. The strategy of this remediation method is to increase the ability of the environment to naturally attenuate the contamination through reductive dechlorination (a scientific process in which the hazardous chemicals are broken down into less hazardous materials). These injections have already occurred and are already working to bio-degrade, or break down the contaminants in the subsurface. Remediation will continue until levels which are acceptable to IDEM are achieved. Groundwater monitoring will be occurring on a quarterly basis to track the progress of remediation.

The indoor air quality is currently being remediated in the Plaza Units and relevant apartment building units. MUNDELL installed indoor air mitigation systems in 2006 (Michigan Plaza) and 2008 (apartment building Nos. 1, 6, and 10) per IDEM's recommendation. The goal of this system is to apply a vacuum on the sub-floor slab air environment and discharge the collected air to safe outside locations, thus mitigating the intrusion to indoor air from subsurface chemical impacts at the Michigan Plaza and apartment buildings.

Four sub-floor slab depressurization units were installed in 2006 in the following spaces at Michigan Plaza: 1) Unit 3801 (current convenience store), 2) Unit 3811 (current vet clinic), 3) Unit 3819 (current Arca de Salvacion), and 4) Unit 3823 (current laundromat). Units were also installed at basement units of three apartment buildings on the southeast side of the Meadows Apartments in 2008 to mitigate the intrusion to indoor air which had shown elevated levels of chemical constituents. Photo Ionization Detector (PID) readings and system sample collection and analysis is being performed on an ongoing basis by MUNDELL in order to track the levels of chemical constituents being removed by the system. A follow-up indoor air sampling event (October 2006) confirmed that the air mitigation systems have reduced the indoor air concentrations by as much as 95% of their previous concentrations, and the mitigation units have continued to operate and remove chemical constituents.

MUNDELL, on behalf of and in conjunction with AMMH, will cooperate and coordinate with IDEM in making public notice, taking public comments, and participating in public meetings, as may be requested. As specified by the IDEM VRP, the Remediation Work Plan is subject to a 30-day public notice and comment period prior to IDEM's decision. At IDEM's discretion, a public hearing may be held during this period. If a hearing is held, MUNDELL will participate, at IDEM's request. Additionally, the applicant will undertake extra public notice activities, such as sending written notices (as described in Section 1.4) to adjacent property owners and sensitive community organizations, and holding public meetings with neighborhood groups at IDEM's request.

The following sections and attachments are the basic components required by the IDEM Office of Land Quality nonrule policy document Waste-0049-NPD.

1.3 Proximate Property Owners/Occupants

AIMCO Michigan Meadows Holdings, LLC (AMMH) previously owned the two properties at the time the pre-existing environmental impacts associated with historic tenant site activities were first identified. AMMH initiated the subsequent environmental investigative and remedial activities to address the environmental conditions, and maintains this oversight role to date. The AMMH contact person is Mr. Peter Cappel in the AIMCO national office in Denver, Colorado. Addresses for each of the owner contacts are as follows:

<u>AMMH</u>
Attention: Mr. Peter Cappel, Vice President of Environmental Health and Safety
AIMCO
4582 South Ulster Street Parkway, Suite 1100
Denver, CO 80237
(303) 691-4560

Gennx Properties VI and Gennx Properties VII, LLC
Attention: Mr. Kevin Krulewitch
234 E. 9th Street Suite B-01
Indianapolis, IN 46204
(317) 955-7572

Michigan Plaza/Maple Creek Village Real Estate Manager
Attention: Mr. Kevin Krulewitch,
The Real Estate Alternative, LLC
3800 W. Michigan St. #1206
Indianapolis, IN 46222

Adjacent property owners to be notified are as follows:

- Property 1: Floral Park Cemetery
  Attention: Mr. Bruce George
  Washington Park Cemetery
  3659 Cossell Road
  Indianapolis, IN 46222

- Property 2: Michigan Street
  City of Indianapolis
  Department of Public Works- Office of Environmental Services
  Attention: Mr. Joseph Arnold
  2700 South Belmont Avenue
  Indianapolis, IN 46221

- Property 3: Olin Avenue
  Attention: Mr. Bruce George
  Washington Park Cemetery
  3659 Cossell Road
  Indianapolis, IN 46222

1.4 Proximate Neighborhood Organizations

Three registered neighborhood organization were identified for the project location. These neighborhood organizations are:

- Greater Garden City Association, Inc.
  46 N. Fleming Street
  Indianapolis, IN 46222
  (317)-241-9647
  www.neighborhoodlink.com/indy/gcca

- Marion County Alliance of Neighborhood Associations – Wayne Township
  Attn: Township Director
  1121 N. Exeter Avenue
  Indianapolis, IN 46222
  www.mcanaindy.org

- Mount Jackson Neighborhood Association
  17 North Berwick Ave
  Indianapolis, IN 46222

- We Care Too
  450 S. Somerset Avenue
  Indianapolis, IN 46241

1.5 Nearby Sensitive Community Institutions

Nearby sensitive community institutions within a two mile search radius from the Site include the following:

1) Kid-X-Clusive Daycare Facility
   3807/3809 West Michigan Street
   Indianapolis, IN
   Distance from Site: 0.0 miles
2) Stephen Foster Elementary School: IPS No 67
   653 N. Somerset Avenue
   Indianapolis, IN
   Distance from Site: 0.3 miles
3) St Anthony's Catholic School & Padua Academy
   349 N. Warman Avenue
   Indianapolis, IN
   Distance from Site: 1.1 miles

4) Wayne Township Schools
Garden City Elementary School
4901 Rockville Road
Indianapolis, IN
Distance from Site: 1.2 miles

5) Ernie Pyle Elementary School: IPS No 90
3351 W. 18th Street
Indianapolis, IN
Distance from Site: 1.3 miles

6) Providence Cristo Rey High School
75 N. Belleview Place
Indianapolis, IN
Distance from Site: 1.3 miles

7) Rhoades Elementary School
502 S. Auburn
Indianapolis, Indiana 46241
Distance from Site: 1.3 miles

8) Speedway United Methodist Church Child Care Ministry
5011 W 16th St
Speedway, IN
Distance from Site: 1.3 miles

9) Speedway Schools: Junior High School
5151 W. 14th Street
Speedway, IN
Distance from Site: 1.4 miles

10) Speedway Schools: Fishers Elementary School
5151 W. 14th Street
Speedway, IN
Distance from Site: 1.4 miles

11) Public Schools: Rhoades Elementary School
502 S. Auburn Street
Indianapolis, IN
Distance from Site: 1.4 miles

12) Public Schools: IPS George Washington Community School
2215 W. Washington Street
Indianapolis, IN
Distance from Site: 1.5 miles

13) Manifest Christian Academy
2501 W. 16th Street
Indianapolis, IN
Distance from Site: 1.6 miles

14) Whitcomb KinderCare
1034 North Whitcomb Ave
Indianapolis, IN
Distance from Site: 1.6 miles

15) St Christopher School
5335 W. 16th Street
Indianapolis, IN
Distance from Site: 1.66 miles

16) Wayne Township Schools
4205 W. Morris Street
Indianapolis, IN
Distance from Site: 1.7 miles

17) Wendell Phillips School 63
1163 North Belmont Ace
Indianapolis, IN
Distance from Site: 1.75 miles

18) Edens Child Development Ministry
739 North Warman Ave
Indianapolis, IN
Distance from Site: 1.8 miles

19) Indianapolis Metropilitan High School
1635 West Michigan St
Indianapolis, IN
Distance from Site: 2.0 miles

20) Public Schools: IPS James A Allison Elementary School
5240 W. 22nd Street
Speedway, IN
Distance from Site: 2.0 miles

21) Pleasant Run Elementary School
2400 N. Tibbs Avenue
Indianapolis, IN
Distance from Site: 2 miles

The following health care facilities were listed within a 2-mile radius search around the Site:

1) Resolute Acquisition Corporation
320 N. Tibbs Avenue
Indianapolis, IN
Distance from Site: 0.6 miles

2) Westpark Rehabilitation
   1316 North Tibbs Avenue
   Indianapolis, IN
   Distance from Site: 1.0 mile

3) Clinic for Women Inc
   3607 W 16th St #B2
   Indianapolis, IN
   Distance from Site: 1.0 mile

4) Westside Health Center
   2732 W Michigan St
   Indianapolis, IN
   Distance from Site: 1.1 miles

5) Genesis Medical Center
   2001 West Michigan St
   Indianapoils, IN
   Distance from Site: 1.75 miles

6) Kindred Hospital Indianapolis
   1700 W. 10th Street # 233
   Indianapolis, IN
   Distance from Site: 1.9 miles

7) United States Government: Medical Center – Richard L Roudebush
   1481 W. 10th Street
   Indianapolis, IN
   Distance from Site: 2.0 miles

The following parks were listed within a 2-mile radius search around the Site:

1) Thatcher & Pool
   4649 W. Vermont Street
   Indianapolis, IN
   Distance from Site: 1.0 miles

2) Ridenour Park
   3800 W Creston Ave
   Indianapolis, IN
   Distance from Site: 1.0 miles

3) Chuck Klein Softball Complex
   4702 Rockville Road
   Indianapolis, IN
   Distance from Site: 1.4 miles

4) Max Bahr Park
300 N Warman Ave
Indianapolis, IN
Distance from Site: 1.7 miles

5) Golc Soccer Fields
2800 W Washington St
Indianapolis, IN
Distance from Site: 1.8 miles

A sample of a written notice is provided as **Attachment B.** This notice will be sent certified mail by MUNDELL to the property owners/occupants, neighborhood organization(s), and the sensitive community institutions as required. No other organizations have requested information on the project at this time.

1.6 Governmental Mailing Lists

The state governmental reviewing agency address is as follows:

Indiana Department of Environmental Management (IDEM)
100 North Senate Avenue
P.O. Box 6015
Indianapolis, IN 46206-6015
(317) 232-8603

The City of Indianapolis is the governmental unit that has jurisdiction of the Site. The governmental units that may be affected and therefore notified by the IDEM regarding the Site may include;

Indiana Department of Environmental Management (IDEM):

Drinking Water Branch / Groundwater Section
100 North Senate Avenue
Indianapolis, IN 46206
(317) 308-3323

The County Health Department:

Marion County Health Department
3838 N. Rural Street
Indianapolis, IN 46205
(317) 221-2000

The Indianapolis Mayor's Office:

Office of the Mayor
200 E. Washington Street
Suite 2501
Indianapolis, IN 46204
(317) 327-3601

1.7 Newspapers' Mailing Addresses

The local newspaper's address is as follows:

Indianapolis Star & News
307 N. Pennsylvania Street
Indianapolis, IN 46204
Legal Advertising
(317) 444-7163

AND/OR

Indianapolis Recorder
2901 N. Tacoma Avenue
Indianapolis, IN 46218
(317) 924-5143

1.8 Public Library Location

The public library closest to the Site is:

Haughville Library
(Branch of the Indianapolis Marion County Public Library)
2121 West Michigan Street
Indianapolis, IN 46222
(317) 275-4420

1.9 Posting a Sign on Site

Attachment C includes the wording of a sign that can be posted on-Site at IDEM's request and approval. If posted, the sign shall meet the following criteria:

- Be visible/readable from 20 feet; and
- Be in English; and
- One sign will be in the office of the Meadows Apartments, and one sign will be distributed to each of the current tenants of the Plaza to be posted in their establishment for general public awareness.

1.10 Public Outreach

On behalf of the representatives of AMMH, MUNDELL will mail the written notice to the proximate property owners/occupants, neighborhood organization, and the sensitive community institutions as listed in **Sections 1.3, 1.4 and 1.5** respectively.

MUNDELL will participate in public meetings as requested by IDEM. The format of the meetings, as well as the meeting schedule and notification schedule, will be determined by IDEM.

1.11 Plan Execution

This complete community relations plan has been prepared on behalf of AMMH as a voluntary action as encouraged in the RISC User's Guide to assist in the public awareness process. Once the remediation work plan is approved, the following process will be initiated as it relates to community relations effort;

- One Copy of the Approved Remediation Work Plan will be placed in the library as listed above.
- IDEM will contact the government agencies as listed above.
- MUNDELL will distribute certified mail copies of the written notice to the organizations listed above in **Sections 1.5**, and any others requesting such notice.
- MUNDELL will provide confirmation that the distribution of written notice was completed in the Remediation Completion Report.

MUNDELL and AMMH will cooperate and coordinate with IDEM in making public notice, taking public comments, and participating in public meetings, as may be requested. Communication between IDEM, MUNDELL and AMMH will remain ongoing so as to be responsive to the project goal of protecting the human health and environmental quality of the surrounding community.

Attachment A
Examples of Notice Given to Date

March 12, 2003

To the Residents of Michigan Meadows Apartments:

As the owner of Michigan Meadows, we have received information indicating that groundwater beneath the apartment complex may be contaminated with two chemical solvents – cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride. We do not currently have sufficient data to determine the full extent of the impacted groundwater.

At the present time, we want to assure you that your drinking water comes from the City of Indianapolis and *not* from this groundwater source.

The source of this contamination is solvents that were used 40 to 50 years ago in degreasing and other manufacturing operations conducted at the former BHT site located at 700 North Olin Avenue which is immediately north of the Apartments (north of Little Eagle Creek).

Genuine Parts Company (GPC) is the current owner of the business that conducted these operations. GPC has applied to the State of Indiana Department of Environmental Management (IDEM) to clean-up the site under Indiana's Voluntary Remediation Program (VRP). As part of its obligations under the VRP, GPC submitted an investigation report and draft Remediation Work Plan that is currently being reviewed by IDEM staff.

We also want to strongly emphasize our commitment to ensure that our residents have a clean, safe environment in which to live. Accordingly, we have:

- initiated testing to identify whether vapors from groundwater are present in any apartments and common areas and whether there may be any potential hazard to tenants;

- requested that IDEM and other state and local agencies participate in the testing and monitoring process; and

- demanded that GPC clean-up the groundwater beneath Michigan Meadows without delay.

We have scheduled a residents' meeting for March 19, 2003, at 7:00 p.m., at Michigan Plaza in order to provide you with an opportunity to learn more about this situation and to answer any questions that you may have as to the testing that we plan to conduct; potential health issues; and how this contamination will be removed. We have invited experts from IDEM and other involved agencies to attend.

In the meantime, if you have any questions regarding this situation or want additional information, please call Nancy Ferrill at (317) 817-7730.

April 15, 2003

To the Residents of Michigan Meadows Apartments:

This is to notify you that we will be proceeding with indoor air testing at Michigan Meadows as we discussed in our March 12, 2003 letter and March 19, 2003 meeting held with residents. Testing will begin the week of April 14 and continue through April 25.

As discussed at the resident meeting, Marion County Health Department (MCHD) and the Indiana Department of Environmental Management (IDEM) do not believe that there are potential health concerns at this time. However, in collaboration with health and environmental officials, we would like to conduct additional testing to determine the scope of underground contamination and gather additional data.

Personnel from Mundell & Associates, Inc., a local environmental consulting firm, will be installing some sampling equipment outside of the apartment buildings. These allow the collection of shallow, below-ground air samples for testing. Next week, Mundell will place air collection canisters in each apartment building in common areas, and in some unoccupied and occupied basement apartments. If you are a resident near these sampling locations, Mundell may contact you directly and ask you questions about your use of household chemicals in the apartment in order to fill out a general questionnaire form. We respectfully request that you cooperate in providing this information when they come by the apartments, as it will allow us to obtain the most accurate information.

Once the canisters are collected and tested, we will be providing summaries of the testing results to the residents, and to IDEM and MCHD for review. As indicated in our resident meeting, all protocols have received IDEM and MCHD approval.

In the meantime, if you have any questions or want additional information, please call Nancy Ferrill at (317) 817-7737. We appreciate your cooperation and thank you for your help.

Sincerely,

Jim Schearer
Regional Vice President

15 de abril del 2003

A los Residentes de Michigan Meadows Apartments:

Esto es para notificarles a ustedes que nosotros vamos a proceder a hacer pruebas al aire en el interior de Michigan Meadows como lo discutimos en nuestra carta del 12 de marzo del 2003 y la reunión con los residentes el 19 de marzo del 2003. Las pruebas empezarán la semana del 14 de abril y continuarán hasta el 25 de abril.

Como se discutió en la reunión de los residentes, el Departamento de Salud del Condado de Marion (MCHD) y el Departamento de Manejo del Medio Ambiente de Indiana (IDEM) creen que no hay ningún potencial de preocupación por la salud en este momento. Sin embargo, en colaboración con los oficiales de salud y del medio ambiente, nos gustaría conducir pruebas adicionales para determinar el alcance de la contaminación subterránea y acumular información adicional.

Personal de Mundell & Associates, Inc., una firma local de consultoría ambiental, va a instalar algunos equipos de prueba fuera de los edificios de apartamentos. Estos permiten coleccionar muestras del aire subterráneo poco profundo para pruebas. La semana que viene, Mundell pondrá recipientes para recolectar aire en cada edificio de apartamentos en áreas comunes, y en algunos apartamentos ocupados y desocupados del sótano. Si usted es un residente cerca de estas localidades de prueba, es posible que Mundell lo contacte directamente y le pregunte a usted acerca de su uso de productos químicos del hogar en el apartamento para poder llenar una forma de cuestionario general. Respetuosamente nosotros le pedimos a usted que coopere proveyendo está información cuando ellos vayan por los apartamentos. Esto nos permitirá obtener la información más exacta.

Una vez los recipientes sean recolectados y probados, nosotros le proveeremos resúmenes de los resultados de las pruebas a los residentes, y a IDEM y MCHD para revisarlos. Como fue indicado en nuestra reunión de residentes, todos los protocolos han recibido la aprobación de IDEM Y MCHD.

Mientras tanto, si usted tiene alguna pregunta o quiere información adicional, por favor llame a Nancy Ferrill al (317) 817-7737. Nosotros apreciamos su cooperación y le damos las gracias por su ayuda.

Sinceramente,

Jim Schearer
Vice Presidente Regional

Michigan Apartments

July 7, 2003

To the residents of Michigan Meadows Apartments:

As discussed in our March 12, 2003 letter and at the March 19, 2003 resident meeting , Mundell & Associates, Inc. has completed air sampling of the apartment buildings. This letter summarizes the sampling results, and provides you with information concerning AIMCO's policies with regard to its tenants.

The air sampling identified detectable levels of chemical compounds in the basement apartments. The Indiana Department of Environmental Management (IDEM) and the Marion County Health Department (MCHD) have reviewed the results and have stated that they present no immediate health concerns. AIMCO will continue to work with IDEM and MCHD to insure the health and well being of our residents.

We are in the process of scheduling another resident meeting with representatives of IDEM and MCHD to address any resident concerns. We will notify you in advance of that meeting.

In the meantime, if you have any questions or want additional information, please call Nancy Ferrill at (317) 817-7737.

Sincerely,

Jim Shearer

Jim Shearer
Regional Vice President

Michigan Apartments

7 de julio del 2003

A los residentes de Michigan Meadows Apartments:

Como lo discutimos en nuestra carta del 12 de marzo del 2003 y en la reunión para residentes del 19 de marzo del 2003, Mundell & Associates, Inc. ha completado la colección de muestras de aire en los edificios de apartamentos. Esta carta resume los resultados de las muestras, y provee a usted con información acerca de las políticas de AIMCO con respecto a sus residentes.

Las muestras de aire identificaron niveles detectables de compuestos químicos en los apartamentos del sótano. El Departamento de Manejo del Medio Ambiente de Indiana (IDEM) y el Departamento de Salud del Condado de Marion (MCHD) han revisado los resultados y han declarado que no presentan ninguna preocupación inmediata por la salud. AIMCO seguirá trabajando con IDEM y MCHD para asegurar la salud y bienestar de nuestros residentes.

Estamos en el proceso de programar otra reunión para residentes con representantes de IDEM y MCHD para dirigirnos a cualquier preocupación de los residentes. Notificaremos a usted de la reunión por adelantado.

Mientras tanto, si usted tiene cualquier pregunta o quiere información adicional, por favor llame a Nancy Ferrill al (317) 817-7737.

Sinceramente,

Jim Shearer

Jim Shearer
Vice Presidente Regional

Michigan Apartments

July 7, 2003

To the basement apartment residents of Michigan Meadows Apartments:

As discussed in our March 12, 2003 letter and at the March 19, 2003 resident meeting, Mundell & Associates, Inc. has completed air sampling of the apartment buildings. This letter summarizes the sampling results, and provides you with information concerning AIMCO's policies with regard to its residents.

The air sampling identified detectable levels of chemical compounds in the basement apartments. The Indiana Department of Environmental Management (IDEM) and the Marion County Health Department (MCHD) have reviewed the results and have stated that they present no immediate health concerns.

Even though IDEM has determined that no immediate action is necessary, AIMCO policy is to provide a high standard of care regarding the health and safety of its residents. Therefore, if any resident of a basement level apartment is concerned with any potential health threats associated with the sampling results, AIMCO will offer three (3) options: (1) AIMCO will pay the costs to relocate you to an available non-basement apartment at Michigan Meadows; (2) AIMCO will pay the costs to relocate you to another nearby AIMCO property; or (3) AIMCO will, at no cost, release you from the terms of your lease if you would choose to relocate to a non-AIMCO property. While not required to do so, AIMCO is offering these options if you have any concerns about your health or exposure to any potential health threats.

If you wish to take advantage of any of these options, please contact Nancy Ferrill at (317) 817-7737.

We are in the process of scheduling another resident meeting with representatives of IDEM and MCHD to discuss the sampling results and address any resident concerns. We will notify you in advance of that meeting.

In the meantime, if you have any questions or want additional information, please call Nancy Ferrill at (317) 817-7737.

Sincerely,

Jim Shearer

Jim Shearer
Regional Vice President

Michigan Apartments

7 de julio del 2003

A los residentes del sótano de Michigan Meadows Apartments:

Como lo discutimos en nuestra carta del 12 de marzo del 2003 y en la reunión para residentes del 19 de marzo del 2003, Mundell & Associates, Inc. ha completado la colección de muestras de aire en los edificios de apartamentos. Esta carta resume los resultados de las muestras, y provee a usted con información acerca de las políticas de AIMCO con respecto a sus residentes.

Las muestras de aire identificaron niveles detectables de compuestos químicos en los apartamentos del sótano. El Departamento de Manejo del Medio Ambiente de Indiana (IDEM) y el Departamento de Salud del Condado de Marion (MCHD) han revisado los resultados y han declarado que no presentan ninguna preocupación inmediata por la salud.

Aunque IDEM ha determinado que no es necesaria ninguna acción inmediata, es la política de AIMCO proveer un nivel alto de cuidado con respecto a la salud y seguridad de sus residentes. Por lo tanto, si un residente de un apartamento del sótano se preocupa por cualquier amenaza potencial a la salud asociada con los resultados de las muestras, AIMCO ofrecerá tres (3) opciones: (1) AIMCO pagará los costos para trasladar a usted a un apartamento disponible de Michigan Meadows que no esté en el sótano; (2) AIMCO pagará los costos para trasladar a usted a otra propiedad cercana de AIMCO; o (3) AIMCO liberará a usted de los términos de su arriendo, sin costo, si usted elige trasladarse a una propiedad que no sea de AIMCO. Aunque no es requerido hacer esto, AIMCO le ofrece estas opciones a usted si usted tiene cualquier preocupación acerca de su salud o exposición a cualquier amenaza a la salud potencial.

Si usted quiere aprovecharse de cualquiera de estas opciones, por favor póngase en contacto con Nancy Ferrill al (317) 817-7737.

Estamos en el proceso de programar otra reunión para residentes con representantes de IDEM y MCHD para hablar de los resultados de las muestras y para dirigirnos a cualquier preocupación de los residentes. Notificaremos a usted de la reunión por adelantado.

Mientras tanto, si usted tiene cualquier pregunta o quiere información adicional, por favor llame a Nancy Ferrill al (317) 817-7737.

Sinceramente,

Jim Shearer

Jim Shearer
Vice Presidente Regional

July 16, 2003

To the Tenants of Michigan Plaza:

As discussed in our March 12, 2003 letter, Mundell & Associates, Inc. has completed air sampling of each commercial property space in Michigan Plaza. This letter summarizes the results, and provides you with information concerning AIMCO's policies.

The air sampling identified detectable levels of chemical compounds. The Indiana Department of Environmental Management (IDEM) and the Marion County Health Department (MCHD) have reviewed the results and have stated that they present no immediate health concerns for the current tenants of Michigan Plaza. AIMCO will continue to work with IDEM and MCHD to insure the health and well being of our tenants.

Even though IDEM has determined that no immediate action is necessary, AIMCO policy is to provide a high standard of care regarding the health and safety of its residents and tenants. Therefore, if any tenant of Michigan Plaza is concerned with any potential health threats associated with the sampling results, AIMCO will, at no cost, release you from the terms of your lease. While not required to do so, AIMCO is offering these options if you have any concerns about exposure to any potential health threats.

We are in the process of scheduling another meeting with representatives of IDEM and MCHD to address any resident or tenant concerns. We will notify you in advance of that meeting.

In the meantime, if you have any questions or want additional information, please call Nancy Ferrill at (317) 817-7737.

Sincerely,

Jim Shearer
Regional Vice President

Michigan Meadows Residents Meeting
on
Genuine Parts Company Environmental Cleanup

1. **Introductions and Background - 5 minutes**
   Jim Shearer and Patti Shwayder, AIMCO

2. **IDEM and VRP Overview - 5 minutes**
   Bill Wieringa, Indiana Dept. of Environmental Mgt. (IDEM)

3. **Environmental Cleanup History, Status and Plan - 10 minutes**
   Bill Wieringa, IDEM

4. **Resident Safety - 10 minutes**
   Marion County Health Department

5. **Air Testing - 5 minutes**
   Patti Shwayder, AIMCO

6. **Questions**
   Bill Wieringa, IDEM
   Jeffrey Larmore & Lisa Cauldwell, Marion County Health Dept.

7. **Wrapup**
   Jim Shearer and Patti Shwayder, AIMCO

Michigan Meadows Residents Meeting
on
Genuine Parts Company Environmental Cleanup

1. **Introductions and Background**

   Jim Shearer and Patti Shwayder, AIMCO

2. **IDEM and VRP Overview**

   Bill Wieringa, Indiana Dept. of Environmental Mgt. (IDEM)

3. **Environmental Cleanup History, Status and Plan**

   Bill Wieringa, IDEM

4. **Resident Safety**

   Marion County Health Department

5. **Air Testing**

   Patti Shwayder, AIMCO

6. **Questions**

   Bill Wieringa, IDEM

   Jeffrey Larmore & Lisa Cauldwell, Marion County Health Dept.

7. **Wrapup**

   Jim Shearer and Patti Shwayder, AIMCO

Documentation of Communication with Floral Park Cemetery

Leena Lothe

From: Leena Lothe
Sent: Wednesday, September 21, 2005 12:37 PM
To: bgeorge@washingtonparkcemetery.org
Cc: John Mundell
Subject: Floral Park Cemetery
Attachments: Proposed Off-Site Boring Locations.pdf

Bruce:

As per our phone conversation, here is some detail on the proposed work on your property.

Please find attached the figure showing approximate boring locations. Two of these locations will be finalized for monitoring well installations.

We will be scheduling a utility locate prior to any drilling.

Also, the access agreement document will be coming to you shortly.

The proposed investigation work at the Floral Park Cemetery is as follows:

1. Advancing six (6) borings to a depth of approximately 40 feet below grade in order to collect three discrete water samples at approximately 20, 30, and 40 feet.
   - The borings will be advanced with a Geoprobe Model 5410 direct push system
   - Field testing of water (test kits) will be conducted followed by shipping samples to the laboratory if needed.

2. Installation and development of two (2) 2-inch groundwater monitoring wells at approximate depths of 30 feet and 45 feet below grade:

   - Monitoring wells will be installed using a truck mounted rig and hollow stem auger methods.
   - The 2-inch wells (Schedule 40 PVC) will be constructed of 10 feet of well screen (0.010 slot) and sufficient riser to reach the surface.
   - The wells will be covered with an 8" x 12" flush-mount protective cover and a 2' x 2' concrete pad.

Please let us know if you have any questions.
Thanks much.
Leena Lothe

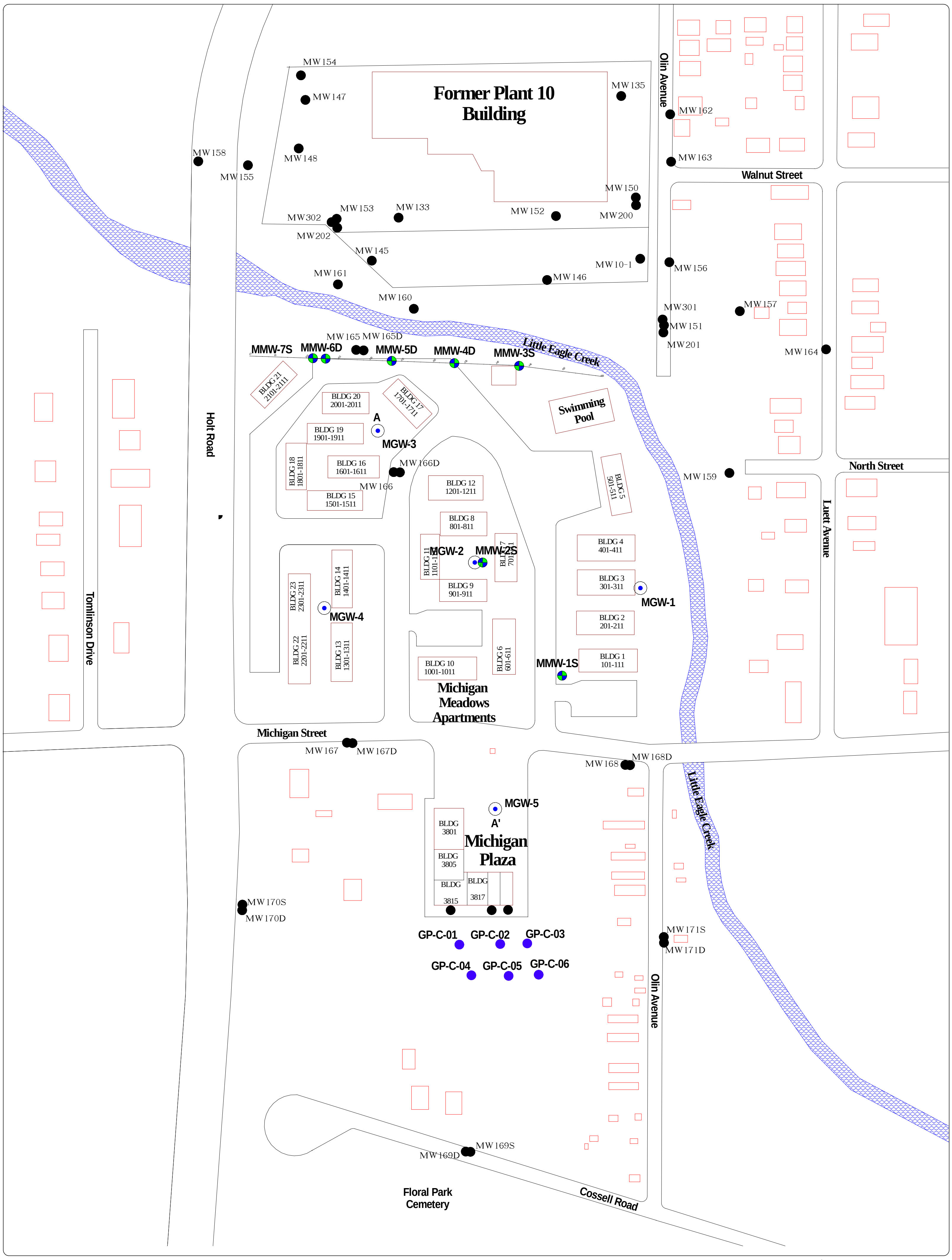
Leena Lothe

From:	Leena Lothe
Sent:	Thursday, September 29, 2005 5:24 PM
To:	bgeorge@washingtonparkcemetery.org
Cc:	John Mundell
Subject:	Access Agreement
Attachments:	AccessAgreementPlazaFinal.pdf; Proposed Off-Site Boring Locations.pdf; cemetery.pdf

Bruce:

Please find attached the access agreement document. Just want to confirm that the part of land that we are proposing to drill on is owned by you (Please see attached aerial view- lots). I am also resending you the proposed drilling locations figure. Can you please confirm receipt of the documents?

Thanks so much.
Leena Lothe



LEGEND

Fence

MW160 Keramida Monitoring Wells

MMW-5D MUNDELL Monitoring Wells (August 2004)

GP-C-04 Proposed Off-Site Geoprobe Locations (approximate)

NORTH

SCALE 0 200 feet

Keramida Monitoring Well Locations Referenced from Keramida Environmental, Inc.
Project No. 2829
March 13, 2002

MUNDELL & ASSOCIATES, INC.
Consulting Professionals for the Earth & Environment

429 East Vermont Street, Suite 200
Indianapolis, Indiana 46202-3688
317-630-9060, fax 317-630-9065

Project Number: M01046	
Drawing File: Base Map.SKF	
Date Prepared: 9/19/05	
Scale: 1"=200' ±	

PROPOSED OFF-SITE BORING LOCATIONS
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana

FIGURE 1

cemetery 3

3912
3910
3908
3904
3902
3900
3659
CREEK ST
OLIN AVE
COSSELL RD
This map does not represent a legal document. It is intended
to serve as an aid in graphic representation only. Information shown
on this map is not warranted for accuracy or merchantability.
Data - Copyright (C) 1986-2002 IMAGIS.
Additional data Copyright (C) 1986-2002 City of Indianapolis - Marion County.
0
0.036mi

Leena Lothe

From: Leena Lothe
Sent: Friday, September 30, 2005 5:07 PM
To: bgeorge@washingtonparkcemetery.org
Cc: John Mundell
Subject: Revised Access Agreement
Attachments: AccessAgreementPlazaFinal.pdf

Bruce:

Please find attached the revised access agreement. Please disregard the one that I sent you yesterday. Sorry for any inconvenience.

Thanks so much.
Leena Lothe

Leena Lothe

From: Leena Lothe
Sent: Thursday, October 13, 2005 12:17 PM
To: bgeorge@washingtonparkcemetery.org
Cc: John Mundell
Subject: Info

Bruce/Ted:

It was great meeting you guys yesterday.

I did talk to John Mundell about the possible life span of the monitoring wells on your property, and our estimation is approximately 7 years or so.

Also, once we're done monitoring, typically the IDNR well abandonment procedure includes plugging/grouting the wells in place. This is what is required in the statute. The other option is over-drilling on the well, grouting it, and then pulling the PVC pipe out (this would require a drill rig on site and would be an expensive deal). We can figure out the best option at that point in time.

Please feel free to contact me (317-630-9060) with any further questions. We would greatly appreciate if you could get back to me with your decision by tomorrow.

Thanks so much.

Regards,
Leena Lothe

MUNDELL & ASSOCIATES, INC.
429 East Vermont Street, Suite 200, Indianapolis, Indiana 46202-3688
Phone: 317-630-9060, Fax: 317-630-9065, email: info@MundellAssociates.com

May 18, 2007

Mr Ted Mau
President
Washington Park Cemetery
3659 Cossell Road
Indianapolis, IN 46222

Re: Request for Property Access for Monitoring Well Installation as Required by IDEM

Dear Mr. Mau:

In order to complete further site investigation activities to address concerns regarding the existence and extent of potential releases of the chlorinated solvents perchloroethylene (PCE) and trichloroethylene (TCE) from Michigan Plaza (3801 West Michigan Street), the Indiana Department of Environmental Management (IDEM) requires installation of a monitoring well approximately 100 to 200 feet south of the Michigan Plaza (**Figure 1**). Also, find attached a copy of the draft access agreement which we had previously sent you.

Please get back to us with a written response in the next 30 days. If you have any questions, please feel free to call (317-630-9060) or email us at our office. You may also contact the Voluntary Remediation Program (VRP) project manager for the Site, Ms. Erin Brittain at 317/233-2991 or ebrittai@idem.in.gov with any questions.

Sincerely,
MUNDELL & ASSOCIATES, INC.

LALothe

Leena A. Lothe
Staff Environmental Engineer

John A. Mundell

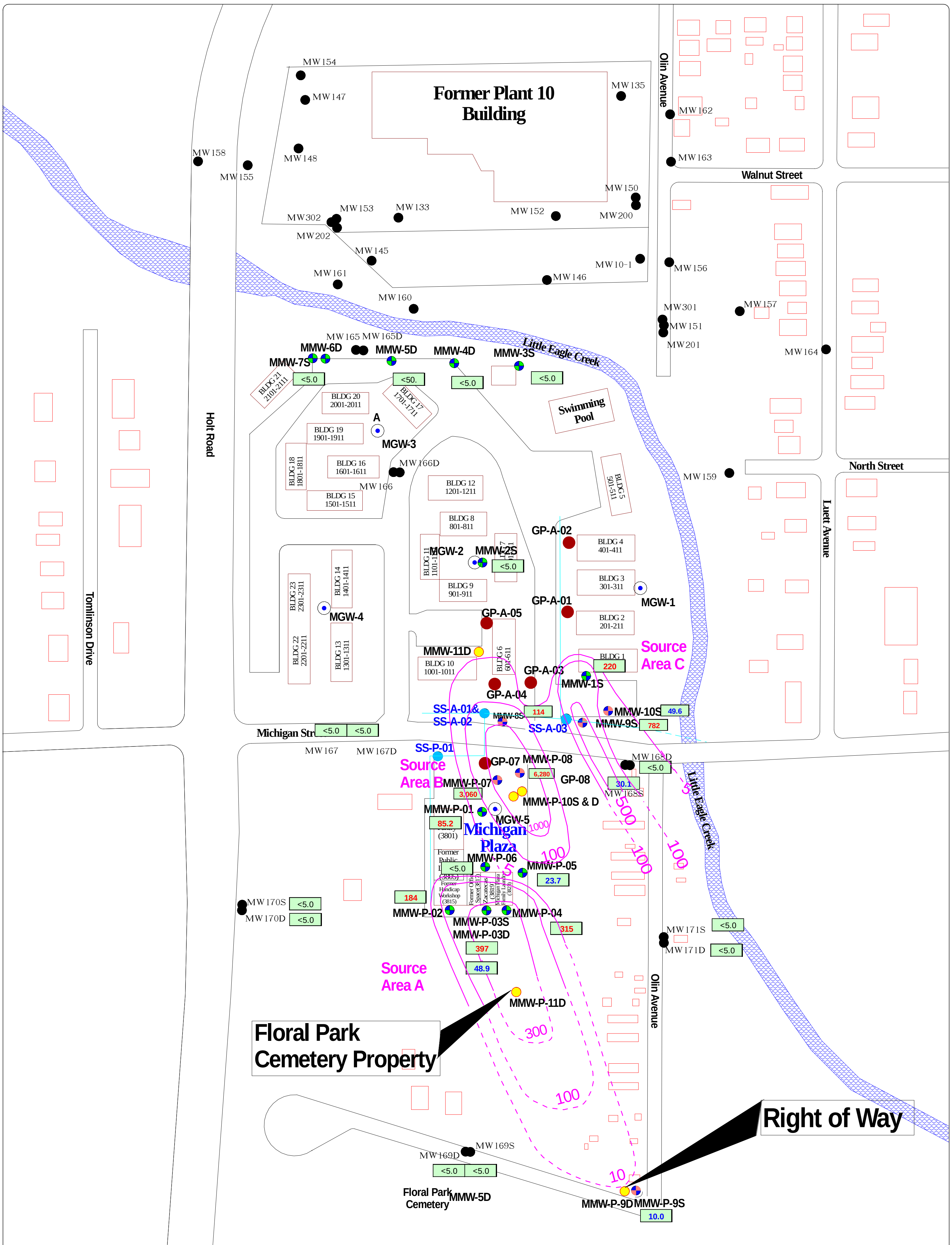
John A. Mundell, P.E., L.P.G.
President/Senior Environmental Consultant

/lal
Attachments:
Figure 1
Draft Access Agreement

cc: Mr. Daniel P. McInerny, Esq, Bose McKinney & Evans
Mr. Stephen Evanoff, AIMCO
Ms. Erin Brittain, Voluntary Remediation Program, Indiana Department of Environmental Management

t:\2001\m01046 michigan meadows apts\floral park cemetery access\letter requesting access.doc

FIGURE



LEGEND

	Fence
MW 160	Keramida Monitoring Wells
	Proposed Monitoring Well Locations (May 2007)
SS-P-01	MUNDELL Sewer Sampling Locations (September & November 2005)
GP-07	MUNDELL Soil Boring Locations (September 2005)
MMW-P-06	MUNDELL Monitoring Wells, Michigan Plaza (September 2005)
MMW-P-07	MUNDELL Monitoring Wells (January 2007)
	Total PCE concentration in groundwater, ppb
	Sewer Line Location
10.0	Total PCE concentration in groundwater, ppb

NOTE:
Values in RED are above RISC Industrial Cleanup Goals and those in BLUE are above RISC Residential Cleanup Goals

MUNDELL & ASSOCIATES, INC.
Consulting Professionals for the Earth & Environment
429 East Vermont Street, Suite 200
Indianapolis, Indiana 46202-3688
317-630-9060, fax 317-630-9065

Project Number:	M01046
Drawing File:	Base Map.SKF
Date Prepared:	4/02/07
Scale:	1"=200'±

PROPOSED MONITORING WELL LOCATIONS (MAY 2007)
Further Site Characterization
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana

FIGURE
1

ATTACHMENT 1

CONFIDENTIAL ACCESS AGREEMENT

This Confidential Access Agreement ("Agreement") is entered into this ____ day of May 2007, between 'Floral Park Cemetery' and 'NHPMN Management LLC', in their capacity as Receiver for NHPMN Management LLC ("Receiver"). The purpose of this Agreement is to provide Receiver and its consultants, contractors and representatives with access to the real estate owned by Bruce George, Washington Park Association that is located at 3659 Cossell Road, Indianapolis, Indiana 46222 (the "Property"), to conduct environmental assessment, investigation and remediation activities necessary to comply with the requirements of the Indiana Department of Environmental Management (IDEM). This Agreement is made subject to the conditions set forth below.

I. ACCESS

1. Receiver shall have access to the Property at all reasonable times for undertaking and conducting activities covered by this Agreement. Receiver shall coordinate with Floral Park Cemetery regarding access to the Property.

2. Receiver shall conduct all of its activities on the Property in a manner that will interfere as minimally as possible with the Property and the Floral Park Cemetery's use of the Property.

II. SCOPE OF LICENSE

This Agreement gives Receiver the right to enter onto the Property to investigate, assess and remediate any contamination arising from the property located at 3801-3823 West Michigan Street, Indianapolis, Indiana (the "NHPMN Management LLC Property"). Activities specifically authorized under this Agreement in, on and around the Property shall include:

1. Investigations to delineate the extent of any soil and groundwater contamination on and off the Property and the NHPMN Management LLC Property;

2. The investigation will include soil borings and groundwater well installation and sampling.

3. Installing, operating, and maintaining all monitoring wells (wells will be flush-mounted/concrete pad, level with existing surface) and related remediation equipment.

4. Performing remediation or other related site assessment activities as deemed necessary by IDEM.

This Agreement is intended and shall be construed only as a temporary unlimited license to enter and conduct the above activities upon the Property and shall not act as a permanent grant of easement or any other permanent interests in the Property. This

Agreement shall be effective on the date signed by the parties and shall continue in effect until Receiver completes the requisite assessment and appropriate remediation required by IDEM.

III. PROPERTY CONDITION

1. Upon request from Floral Park Cemetery, Receiver shall provide Floral Park Cemetery with copies of any reports and monitoring data obtained from the Property that is provided to IDEM.

2. Receiver shall give reasonable notice to Floral Park Cemetery prior to installation of any soil borings, monitoring wells, or removal of any monitoring wells or the initiation of any monitoring activities.

3. Any samples, waste materials, soil cuttings, hazardous wastes, hazardous substances, pollutants, contaminants, or free product which results from activities conducted under this Agreement shall be handled, stored, treated, transported, and disposed of, as necessary, in accordance with all applicable local, state, and federal laws, regulations, and ordinances.

IV. TOOLS AND EQUIPMENT

All tools, equipment or other property placed upon the Floral Park Cemetery Property by Receiver shall remain the property of Receiver and may be removed by Receiver at any time within a reasonable time after the expiration of this Agreement. Receiver shall conduct its activities in a manner so as to minimize the disturbance to existing site conditions. Any disturbance to the Property resulting from Receiver's activities shall be restored to as close to original conditions as reasonably possible.

V. INDEMNITY

1. Receiver will indemnify and hold harmless Floral Park Cemetery and his agents, successors and assigns, either individually or in their representative capacity, from all actions, claims, demands, liabilities, and damages as a consequence of any act or omission on the part of Receiver or anyone acting on behalf of Receiver in the exercise of its rights under this Agreement.

VI. CONFIDENTIALITY

Floral Park Cemetery, including his representatives, heirs, agents, assigns, spouse and attorneys, agree that, except as may be required by law, none of them, nor any person acting by, through, under or in concert with them, shall discuss, publish or in any fashion disclose any of the terms of this Agreement or the contents of any reports or monitoring data given to Floral Park Cemetery by Receiver without prior written permission of Receiver. The contents of this Agreement shall be designated "confidential" and shall not be disclosed to any person, government agency and/or other entity at any time absent Receiver's prior written consent.

VII. GOVERNING LAW

This Agreement shall be construed and enforced in accordance with the laws of the State of Indiana. The parties agree that all disputes concerning the interpretation or implementation of this Agreement shall be resolved by an Indiana court of competent jurisdiction.

VIII. ADDITIONAL PROVISIONS

1. Negotiated Agreement; Construction. This Agreement is the result of negotiations between the parties and their respective legal counsel, and no party shall be deemed to be the drafter of this Agreement or any of the agreements or documents referred to herein. The language of all parts of this Agreement shall in all cases be construed as a whole, according to its fair meaning, and not strictly for or against either party.

2. Representations and Warranties. The parties warrant that no promises or inducements for this Agreement have been made except as herein set forth, that they are competent and duly authorized to execute this Agreement, and that they execute it knowingly and voluntarily and accept responsibility therefor. The parties further acknowledge that they have received independent legal advice from their attorney or attorneys with respect to the advisability of signing this Agreement, and execution hereof is made without reliance upon any advice, statement or representation made by any other party.

3. Successors. Each of the covenants herein shall be binding upon and shall inure to the benefit of the heirs, executors, administrators, assigns and successors in interest of the signatory parties to this Agreement.

4. Additional Documents. All parties agree to cooperate fully, to execute any and all supplementary documents and take all additional actions that may be necessary or appropriate to give full force and effect to the terms and intent of this Agreement which are not inconsistent with its terms.

5. Entire Agreement. This Agreement contains the entire agreement among the parties and the terms hereof are contractual and not mere recitals.

6. Original Agreement. This Agreement may be executed in two or more counterparts, each of which shall constitute an original, but all of which, when taken together, shall constitute but one Agreement.

IN WITNESS WHEREOF, the parties have executed this Agreement effective as of the date first written above.

Date: ____________________________ By: ____________________________
Representative of Floral Park Cemetery

Date: ____________________________ By: ____________________________

Chuck Viale, NHPMN Management LLC

Date: ____________________________ By: ____________________________

MUNDELL & ASSOCIATES, INC.
429 East Vermont Street, Suite 200, Indianapolis, Indiana 46202-3688
Phone: 317-630-9060, Fax: 317-630-9065, email: info@MundellAssociates.com

July 27, 2007

Ms. Erin Brittain
Project Manager
Voluntary Remediation Program
Office of Land Quality
100 North Senate Avenue
Indianapolis, Indiana 46204

Re: **Floral Park Cemetery -Monitoring Well Installation**
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana 421325
IDEM Incident # 0000198
MUNDELL Project No. M01046

Dear Ms. Brittain:

MUNDELL met with Mr. Ted Mau, President, Washington Park Cemetery, and other representatives of Floral Park Cemetery on July 25, 2007 to discuss the possibility of installing a monitoring well on their property as required by the Indiana Department of Environmental Management (IDEM) for the following reasons:

- In order to better delineate the extent of potential releases of the chlorinated solvents perchloroethylene (PCE) and trichloroethylene (TCE) from Michigan Plaza (3801 West Michigan Street), and
- To continually track the effectiveness of the bioremediation, especially on the plume emanating south of Michigan Plaza.

The area of interest (approximately 100 to 200 feet south of the Michigan Plaza) is currently under construction, and has been excavated for the purpose of putting in a retention pond. It was decided to hold off on the monitoring well installation until this water feature and the rest of the construction is completed (December 2007), and come back in early 2008 to install the monitoring well. Floral Park Cemetery representatives will then grant access to their property and grant permission for installation and quarterly sampling of the monitoring well. After the discussion with the cemetery representatives, the best location for the monitoring well appears to be just east of the retention pond, approximately 100 to 200 feet south of the Michigan Plaza. This location is along the centerline of the plume radiating south of Michigan Plaza.

MUNDELL will contact the cemetery representatives in January 2008 in regards to getting the final access agreement in order to proceed with the monitoring well installation.

In the meantime, if you have any questions, please contact MUNDELL at (317) 630-9060.

Sincerely,
MUNDELL & ASSOCIATES, INC.

Leena A. Lothe
Staff Environmental Engineer

John A. Mundell, P.E., L.P.G.
President/Senior Environmental Consultant

cc: Mr. Stephen Evanoff, AIMCO
Mr. Ted Mau, Washington Park Cemetery

MUNDELL & ASSOCIATES, INC.
429 East Vermont Street, Suite 200, Indianapolis, Indiana 46202-3688
Phone: 317-630-9060, Fax: 317-630-9065, Net: info@MundellAssociates.com

August 22, 2007

Mr. Tom Martin Jr.
Marten Construction Management
5174 Allison Ville Road
Indianapolis, Indiana 46205

RE: Michigan Plaza Sewer Soils Excavation
3801 W. Michigan Street
Indianapolis, IN.

Via Email Transmission

Dear Tom;

MUNDELL & ASSOCIATES, INC. (MUNDELL) has appreciated your communication with us regarding your sanitary sewer tie in over at the Michigan Plaza right of way south of Michigan Road. We understand you will be horizontally advancing this sewer and then excavating down to the invert around a portion of this manhole to tie in the sewer line. MUNDELL is writing to make you aware you may be coming in contact with soils that are impacted with chlorinated solvents, specifically Perchloroethene (PCE), Trichloroethene (TCE), cis-1,2-Dichloroethylene (cis-1,2-DCE) and vinyl chloride (VC), which at high levels can present certain human health risk. We understand these soils are within the right of way of city property, but may still require special handling attention.

Our IDEM Project Manager, Erin Brittain, has given direction that the soils should be monitored such that soils impacted with levels of VOCs above IDEM RISC default Industrial cleanup levels should not be put back in the excavation. If given 2 days lead notice, MUNDELL can be available to be on site while these excavation activities are occurring for the purpose of screening excavated soils and making a field decision on whether it is likely soils may be above IDEM RISC default industrial cleanup levels. MUNDELL will utilize a field instrument capable of detecting volatile organic compounds (VOCs) to aid in this screening. If it appears soils may be impacted above these levels, we would be prepared to grab a minimum of one soil sample representative of the most impacted area from your backhoe bucket and would submit it for a rush VOC analyses. This would require the excavation to remain open for short period, after which the results (within 24-hours) would give indication of whether soils can be placed back in the excavation as you originally planned or if they would need special waste classification and disposal. MUNDELL will look into what provisions would be allowed by our client to dispose of this waste appropriately.

Please let us know in general if this approach is agreeable to you and your team at Marten, as we hope to contribute to a solution for safety and protection of human health and the environment during this portion of your activities. Please do not hesitate to contact us at 317-630-9060 to discuss this situation or email us back with your response.

We appreciate the opportunity to provide this letter report to you. If you should have any questions, please do not hesitate to contact me (317-630-9060).

Sincerely,
MUNDELL & ASSOCIATES, INC.

Chris Jaros, E.I.T.
Project Environmental Engineer

John A. Mundell, P.E., L.P.G.
President/Senior Environmental Consultant

/cdj

cc: Mr. Daniel P. McInerny, Esq, Bose McKinney & Evans
Mr. Stephen Evanoff, AIMCO
Ms. Erin Brittain, Indiana Department of Environmental Management
Mr. Tom Martin Sr., Marten Construction Management
Mr. John Buckley, Marten Construction Management

Attachment B
Future Written Notice Sample

CERTIFIED MAIL
Return Receipt Requested

Date
Resident/Occupant
Mailing Address

Re: Notification of a Proximate Voluntary Remediation Program (VRP) Site

Dear Resident/Occupant:

This notice is being provided to inform you that Michigan Plaza, located at 3801-3823 Michigan Street, Indianapolis, Indiana, has been approved to participate in the Indiana Department of Environmental Management (IDEM)'s Voluntary Remediation Program.

Through past environmental testing, residual amounts of several chemicals have been detected at levels which warrant treatment in order to ensure that the property does not pose a threat to either health or the surrounding environment. Specifically, investigations have revealed the presence of several chemicals known as chlorinated solvents. These include perchloroethylene (PCE, or "Perc") and lesser amounts of trichloroethylene (TCE), cis-1,2-Dichloroethene, trans-1,2-DCE and vinyl chloride. In light of past industrial activity in the vicinity, the presence of these substances is not surprising, but must nonetheless be addressed.

With approval from IDEM, Mundell & Associates, Inc. (MUNDELL), on behalf of the Michigan Plaza property owner, has already begun cleanup of groundwater by the injection of a food-grade soybean oil into the groundwater to break down the contaminants. Indoor air mitigation units have also been installed to control contaminants detected in indoor air spaces while remediation is ongoing. These remediation initiatives will continue until detectable presences of these contaminants are within acceptable IDEM levels.

This notice is a requirement of a Community Relations Plan which has been developed by the Applicant and is a component of the Remediation Work Plan that is available for review at the repository listed below. The Community Relations Plan includes provisions for notifying all other local entities. In addition, the Community Relations Plan may require the applicant to post an informational sign at the subject property. For additional information about the Community Relations Plan and the Remediation Work Plan, please review the documents in the repository or contact the IDEM Project Manager at (317) 233-2991. The identification number for this property is: VRP Site #6061202.

The Community Relations Plan and the Remediation Work Plan can be viewed at the local repository, which is the Central Branch of the Marion County Public Library, located at;

Haughville Library
(Branch of the Indianapolis Marion County Public Library)
2121 West Michigan Street
Indianapolis, IN 46222
(317) 275-4420

These documents will be available for review at this repository for 30 days.

Future publication of the specific time period for public comment will appear in the Indianapolis Star newspaper and/or the Indianapolis Recorder, located respectively at 307 North Pennsylvania Street, Indianapolis, IN 46204, and 2901 North Tacoma Avenue, Indianapolis, IN 46218.

Finally, in addition to providing you with the above information as a required component of our Community Relations Plan, the property owner also wants to encourage you to contact us and/or IDEM with any specific questions or concerns which you might have about the existing contamination and our remediation efforts. Should you want to discuss this or other matters further, please don't hesitate to contact John Mundell at 317-630-9060, or by e-mail, at jmundell@mundellassociates.com.

Thank you.

Sincerely,

John A. Mundell, P.E., L.P.G.
President/Senior Environmental Consultant
MUNDELL & Associates, Inc.

Attachment C
Sign to Be Posted

Let it be hereby known that this site, Michigan Plaza - at 3801-3823 Michigan Street, Indianapolis, IN is a Voluntary Remediation Program (VRP) cleanup site. The Indiana Department of Environmental Management (IDEM) has assigned this site a VRP number of 6061202. If you wish to obtain more information regarding the site or the VRP, please call (317) 233-2991, or go online to www.in.gov/idem/land/vrp/.